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TO: Interested Parties

FROM: Andrew W. Hogarth, Remediation and Redevelopment Division

SUBJECT: RRD Operational Memorandum No. 1  
Part 201 Cleanup Criteria  
Part 213 Risk-based Screening Levels

The Remediation and Redevelopment Division (RRD) of the Michigan Department of Environmental Quality (MDEQ) is issuing the attached RRD Operational Memorandum No. 1. This Operational Memorandum provides general information about the criteria tables and the criteria for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) and Part 213, Leaking Underground Storage Tanks, of the NREPA. The MDEQ has developed interim cleanup criteria developed for acetate, dicamba, methane, metribuzin, and sodium azide, and is allowing a 45 day public comment period on these criteria. The following information is intended to assist in understanding the process followed for criteria changes within this Operational Memorandum. The criteria tables of this Operational Memorandum (Attachment 1) have been revised in accordance with rule provisions that allow criteria to be added and revised in the following categories:

**Changes in the Target Detection Limits**

Criteria with the footnote (M) promulgated with the Part 201 Administrative Rules represent situations where the calculated risk-based criterion was below the designated analytical target detection limit. In accordance with provisions of R 299.5103(l) "target detection limits" (TDL) is defined as the detection limit for a hazardous substance in a given environmental medium that is specified by the MDEQ on a list that it publishes not more than once a year. The TDL for a given hazardous substance is greater than or equal to the method detection limit for that hazardous substance. In establishing a TDL, the department must consider:

- The low level capabilities of methods published by governmental agencies
- Reported method detection limits published by state laboratories.
- Reported method detection limits published by commercial laboratories
- The need to be able to measure a hazardous substance at concentrations at or below cleanup criteria.

The TDLs previously designated by the MDEQ in Operational Memoranda were reviewed considering these factors, and proposed revisions were provided to the Michigan Environmental Laboratory Association for comment. Revised TDLs were included in the TDLs published with RRD Operational Memorandum No. 2. The effective date of the revised TDLs has been extended to February 1, 2005, to allow adequate implementation time for laboratories and monitoring plans. The criteria tables reflect the revised TDLs as indicated in Attachment 2 of this Operational Memorandum. Criteria revisions based on revised TDLs will also become effective February 1, 2005.

### **Changes in Drinking Water Criteria**

If a new state drinking water standard is established or a state drinking water standard is changed the drinking water standard developed under the Michigan Safe Drinking Water Act, Section 5 of 1976 PA 399, becomes the generic residential cleanup criterion (R 299.5706a(12), R 299.5744, Section 20120a(5) and 21304a(4) of the NREPA). The criteria tables reflect changes in the state drinking water standards as indicated in Attachment 2 of this Operational Memorandum. *These criteria are effective immediately.*

### **Changes in Criteria Previously Designated as "ID" or "NA"**

Criteria promulgated with the Part 201 Administrative Rules that were designated with a footnote "ID" or "NA", represent situations where insufficient data was available to calculate risk-based criterion. In accordance with provisions of R 299.5706a(11) if the MDEQ obtains sufficient information to support the calculation of a cleanup criterion the MDEQ must use best available information to calculate a criterion for the hazardous substance. The MDEQ has calculated water quality standards pursuant to R 323.1057 of Part 31 of the NREPA for hazardous substances previously designated as "ID" or "NA". These water quality standards become groundwater surface water interface (GSI) criteria pursuant to R 299.5716(6), and Section 20120(15) of the NREPA. The new GSI criteria are effective immediately. The soil criteria tables also include an interim Soil Volatilization to Indoor Air criterion for methane. This criterion was developed specifically to address acute physical hazards, specifically explosivity (R 299.5728(1)(d)). The MDEQ is allowing a 45 day public comment period on this methane criterion. A final criterion will be published following the comment period.

### **Hazardous Substances Not Previously Listed in the Criteria Tables**

For a substance not previously listed in the cleanup criteria tables the MDEQ may determine that it is a hazardous substance and develop generic criteria using best available information about the toxicological and physical chemical properties of the substance (R 299.5706a(10)). There are four new hazardous substances for which interim criteria have been developed. They are: acetate; dicamba; metribuzin; and sodium azide. The MDEQ is allowing a 45 day public comment period on these criterion. Final criteria will be published following the comment period. A brief summary of the toxicological bases for the interim criteria follows.

**Acetate:** The drinking water criteria were derived using a chronic reference dose (RfD) of 5.7E-1 mg/kg-day (MDEQ/ERD, 1992). A no-observed-adverse-effect-level (NOAEL) of 1.0 g/kg/day was identified for calcium magnesium acetate in male and female rats dosed by gavage (Chevron Environmental Health Center, 1987). The GSI criterion is based on the water quality standard calculated pursuant to R 323.1057 as provided by R 299.5716(6).

Key reference: Chevron Environmental Health Center. 1987. Twenty-eight day oral toxicity study in rats with Ortho Ice-B-Gon Deicer. J.R. Cushman, Study Director. Richmond, CA.

**Dicamba:** A chronic RfD of 3.0E-2 mg/kg/day was obtained from the U.S. EPA Integrated Risk Information System (IRIS) file dated July, 1992. This reference dose serves as the basis for the criteria. See IRIS for details.

**Metribuzin:** The criteria are based on a chronic RfD of 2.5E-2 mg/kg/day from IRIS (January 1995). See IRIS for details.

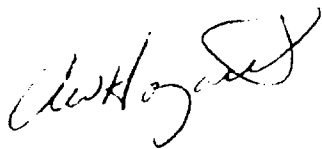
**Sodium azide:** An RfD of 1.2E-2 mg/kg/day was derived July 2003 by RRD toxicologists. The key study is a two-year gavage study in rats. Low dose animals exhibited decreased body

weights and necrosis of the cerebrum. The RfD is based on lowest observed adverse effect level (LOAEL).

Key reference: National Toxicology Program. 1991. Toxicology and Carcinogenesis Studies of Sodium Azide. September 1991. NTP TR 389. U.S. Department of Health and Human Services.

Comments on the interim criteria for methane, acetate, dicamba, metribuzin, and sodium azide should be postmarked no later than January 24, 2005, and should be sent to the attention of Ms. Christine Flaga, Chief, Toxicology Unit, Remediation and Redevelopment Division, Michigan Department of Environmental Quality, P.O. Box 30426, Lansing, Michigan, 48909 (Mail Code: 76115).

Attachments

A handwritten signature in black ink, appearing to read "Christine Flaga", is located in the lower-left quadrant of the page.



## Remediation and Redevelopment Division

*Michigan Department of Environmental Quality*

December 10, 2004

### RRD OPERATIONAL MEMORANDUM NO. 1

**SUBJECT: PART 201 CLEANUP CRITERIA  
PART 213 RISK-BASED SCREENING LEVELS**

**Key definitions for terms used in this document:**

<b>NREPA:</b>	The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended
<b>Part 201:</b>	Part 201, Environmental Remediation, of NREPA
<b>Part 213:</b>	Part 213, Leaking Underground Storage Tanks, of NREPA
<b>MDEQ:</b>	Michigan Department of Environmental Quality
<b>RRD:</b>	Remediation and Redevelopment Division
<b>U.S. EPA:</b>	United States Environmental Protection Agency
<b>CAP/RAP:</b>	"Corrective action plan" pursuant to provisions of Part 213 of NREPA and "remedial action plan" pursuant to provisions of Part 201 of NREPA
<b>Criteria or criterion:</b>	Includes the cleanup criteria for Part 201 of NREPA and the Risk-Based Screening Levels as defined in Part 213 of NREPA and R 299.5706a(4)
<b>Facility:</b>	Includes "facility" as defined by Part 201 of NREPA and "site" as defined by Part 213 of NREPA
<b>Response actions:</b>	Includes "response activities" as defined by Part 201 of NREPA and "corrective action" as defined by Part 213 of NREPA
<b>TSD:</b>	Technical Support Document

This operational memorandum has been prepared to facilitate implementation of Part 201 and Part 213 of NREPA. The RRD Operational Memorandum No. 1 supersedes all previous MDEQ operational memoranda pertaining to Part 201 and Part 213 criteria. The attached tables (Attachment 1) identify the generic cleanup criteria for groundwater and soil developed pursuant to Sections 20120a and 21304a of NREPA, according to relevant statutory provisions and the methods and equations presented in the respective attached TSDs. The criteria in Attachment 1 reflect some new and revised criteria developed in accordance with R 299.5706a and are based on new and revised target detection limits which were developed in accordance with R 299.5103(l). The revisions to criteria which are associated with revised target detection limits (TDLs) are effective February 1, 2005. Other new and revised criteria developed in accordance with R 299.5706a are, by operation of rule and law, effective immediately.

This operational memorandum provides general information about the criteria tables and the criteria. It also provides direction for the implementation of the criteria for site investigation and response actions under Part 201 and Part 213 of NREPA. Details about methodology and implementation of the criteria are provided in the respective TSDs. The TSDs are also



applicable to Part 213. This operational memorandum must be used in coordination with other MDEQ operational memoranda regarding implementation of Part 201 and Part 213.

The Part 201 Administrative Rules took effect on December 21, 2002, and include the criteria. Existing cleanup criteria cannot be modified unless the rules are repromulgated. However, for substances currently not listed in the cleanup criteria tables, the MDEQ can determine if the substance is hazardous using the best available information and use that information to develop cleanup criteria (R 299.5706a(10)). For substances currently listed in the cleanup criteria tables and designated "ID" or "NA" for certain pathways, the MDEQ can use the best available information to generate cleanup criteria for those pathways (R 299.5706a(11)). If a new state drinking water standard is established or an existing state standard is changed, the drinking water standard will become the generic drinking water criterion (R 299.5706a(12)). These new criteria will take effect when published and announced by the MDEQ (R 299.5706a(13)). Any questions regarding substances for which criteria are not included in the criteria tables can be directed to the MDEQ-RRD Toxicology Unit.

#### **GENERAL INFORMATION ABOUT THE CRITERIA TABLES**

Hazardous substances in the attached criteria tables are listed alphabetically. The criteria are presented in three tables entitled: Table 1. Groundwater: Residential and Industrial-Commercial; Table 2. Soil: Residential and Commercial I; and Table 3. Soil: Industrial and Commercial II, III, and IV. A footnote is designated by a letter in parentheses and is explained in the footnotes section that follows the criteria tables. Chemical Abstract Service numbers are provided to assist with identification of the correct hazardous substance. Table 4 of Attachment 1 presents the toxicological and chemical-physical data used to generate the criteria.

Each column of criteria has a numbered heading that is associated with two guide sheets; one for statistics and one for cleanup criteria. These guide sheets are part of the Part 201 criteria and statistics training material prepared for staff. The criteria guide sheets contain implementation information for the various criteria, and the statistical guide sheets provide direction on the use of statistics. The criteria guide sheets are contained in the Training Material for Part 201 Cleanup Criteria and the statistical guide sheets are contained in the MDEQ Sampling Strategies and Statistics Training Materials. These are both located on the MDEQ web site (<http://www.michigan.gov/deq> select "Land," "Land Cleanup," "Site Investigation and Cleanup"). The criteria tables within the criteria training material provide the hazardous substances listed according to analytical group.

The attached criteria tables present some of the criteria within a bolded box; these boxed values represent the lowest generic residential soil or groundwater criterion for a given hazardous substance. Values in bold boxes are presented for those hazardous substances having either a full set of criteria or a partial set where professional judgment can be made that the lowest presented criterion is protective of pathways lacking criteria. Therefore, groundwater or soil concentrations equal to or less than the value in the bolded box comply with generic criteria for all pathways although some of these pathways may not be relevant. For example, the drinking water criteria are not applicable at locations where it is documented that groundwater is not in an aquifer and not in contact with an aquifer. However, if the drinking water criterion is in a bolded box and groundwater concentrations do not exceed this value, it may be concluded that groundwater complies with the criteria for all other groundwater pathways. The values in bolded boxes are most useful for determining whether a location is a facility.

The lowest criterion is not bolded for hazardous substances lacking groundwater surface water interface (GSI) criteria. With respect to hazardous substances lacking GSI criteria, it may not



be possible to reach definitive conclusions regarding status as a facility or compliance with cleanup criteria until a GSI criterion is generated.

For all criteria and pathways, a person proposing or implementing response activities where a criterion for a relevant pathway is not available must supply the data necessary for the MDEQ to generate a criterion. An exception may be made where the MDEQ can determine that measured concentrations are protective (R 299.5706(3)).

#### **GENERAL INFORMATION ABOUT THE CRITERIA**

The criteria, flammability and explosivity screening levels (FESLs), and acute inhalation screening levels (AISLs) are presented in the tables. The screening levels are, however, considered to be protective for the concerns they address. If a concentration of a hazardous substance is higher than the FESL or the AISL, then the person proposing or implementing response activities shall document whether additional response activity is required to protect against those acute hazards (R 299.5706a(1)). Further details about these screening levels are presented in the FESL/AISL TSD (RRD Operational Memorandum No. 1, Attachment 10).

The criteria were developed using available chemical-specific toxicological and chemical-physical data, exposure data, or other data. Chemical-specific data used to develop the criteria and screening levels are presented in R 299.5752.

The criteria are presented in two significant figures. Some chemical-physical data are presented in more than two significant figures to retain mathematical precision. Cleanup criteria from the attached table should be compared to analytical data presented in two significant figures. Any statistical manipulation of the data should be done using the reported (unrounded) data with rounding occurring as the last step.

Analytical target detection limits (TDLs) and available analytical methods that are capable of achieving the TDLs have been designated by the MDEQ pursuant to R 299.5103(l) and are provided in RRD Operational Memorandum No. 2, Attachment 1. If the TDL is greater than the risk-based cleanup criterion for a hazardous substance in a given environmental medium, the TDL is used in place of the risk-based value as the cleanup criterion. In such cases, TDLs are presented in the criteria tables and footnoted where appropriate; risk-based criteria are presented along with the TDLs. A background concentration may be substituted for the generic cleanup criterion when the cleanup criterion is less than background (R 299.5707, R 299.5706a(5)(b)). Background soil may be represented by the statewide default background level, regional background developed using the Waste and Hazardous Materials Division (WHMD) Michigan Background Soil Survey April 1991, or facility-specific background developed by the party proposing response activities. Background levels have not been substituted for criteria in the tables since these three options exist. However, the background footnote is presented for substances where background may be substituted. Statewide default values are shown for those substances for which they have been derived. See column 10 of the soil criteria tables. Background for groundwater must be determined on a facility-specific basis if proposed as a default cleanup criterion. Additional guidance regarding establishing facility-specific background concentrations is available in the RRD Operational Memorandum No. 4.



If a generic criterion is greater than the respective soil saturation concentration ( $C_{sat}$ ), the person proposing or implementing response activity must document whether additional response activity is required to control free-phase liquids or protect against related hazards (R 299.5706a(2)(a)). In the criteria tables, the  $C_{sat}$  value is included when the calculated risk-

based soil criterion is greater than  $C_{sat}$  and footnoted as such in the tables. R 299.5718(2) states that when the health-based criterion is greater than the  $C_{sat}$  concentration, the  $C_{sat}$  concentration becomes the criterion for that pathway unless a facility-specific  $C_{sat}$  concentration is generated. Concentrations greater than  $C_{sat}$  are acceptable cleanup criteria for the footnoted pathways where a site-specific demonstration indicates that free-phase material containing a hazardous substance is not present (R 299.5750(C)). Calculated values which exceed  $C_{sat}$  are not presented in the tables but may be obtained by contacting the MDEQ-RRD Toxicology Unit.

A groundwater criterion that exceeds the hazardous substance specific water solubility value defaults to the water solubility value (R 299.5708(2) and R 299.5750(S)) and is footnoted as such in the tables.

#### **NEW INFORMATION ABOUT THE CRITERIA**

Lead concentrations in both the fine (less than 250 microns) and coarse soil fractions are necessary to evaluate the risks from exposure to lead in soil. For comparison to the soil direct contact criteria and the particulate soil inhalation criteria for lead, the concentration of lead in the fine fraction must be determined. For all other soil criteria, the total concentration of lead in soil must be determined. Refer to the RRD Operational Memorandum No. 2, Attachment 1, Footnote 13 and Attachment 5, Page 3 for additional details on lead analyses.

#### **IMPLEMENTATION OF THE CRITERIA**

The following information describes the process that should be followed for identifying the relevant pathways and applicable criteria for response actions under Part 201 and Part 213 of NREPA.

##### **Selecting Final Cleanup Criteria**

The following process should be used in determining the final cleanup criterion for a given hazardous substance in soil and/or groundwater.

##### **1. Identify the relevant pathways.**

Sections 20120a and 21304a require that the MDEQ utilize only reasonable and relevant exposure pathways in determining cleanup criteria. Each set of generic criteria correspond to a specific exposure pathway. R 299.5103(h) defines relevant pathway as an exposure pathway that is reasonable and relevant because there is a reasonable potential for human or non-human exposure to a hazardous substance to occur. An exposure pathway is the course a chemical takes from a source to an exposed organism. The components of an exposure pathway are a source or release of a hazardous substance, an exposure point, an exposure route, and, if the exposure point is not the source or point of release, a transport medium. It represents a mechanism by which an individual or population is exposed to chemicals at or originating from a facility. A pathway is relevant when exposure can occur even if exposure controls are or will be relied upon to prevent exposure and even if concentrations are less than applicable criteria. For example, ingestion of contaminated drinking water is a relevant pathway even in the presence of institutional controls or use restrictions. A pathway may not be



relevant due to natural physical characteristics that preclude the pathway from occurring. For example, the absence of a hydraulic connection to surface water in the vicinity of the facility and no indirect discharge to a surface water via a storm drainage system eliminates the potential for surface water to be impacted by the groundwater venting to surface water pathway (R 299.5716(1)).

R 299.5532(7) states that a Part 201 RAP shall evaluate all of the pathways, risks, and conditions listed in the rule to identify those that are relevant for the facility. Further information about the relevance of a pathway is presented in the rules for each exposure pathway. Part 213 CAPs must similarly evaluate the potential exposure pathways and identify those that are relevant. The evaluation must be based on the same exposure assumptions used for the development of the criteria that are contained within these rules.

2. Identify all the applicable criteria.

R 299.5101(c) defines an applicable criterion as a cleanup criterion for a relevant pathway. A criterion is not applicable if the exposure pathway is not relevant at a particular facility or if the exposure it addresses is reliably restricted by a restrictive covenant or institutional control or other allowed mechanism. Whenever a pathway is relevant, the associated criteria are applicable unless exposure can be reliably controlled by land or resource use restrictions or institutional controls.

*Cleanup criteria may be applicable to waste material if the generic assumptions for the criteria are representative of the waste material. If the criteria are not applicable to the waste material, a site-specific evaluation must be conducted.*

3. Select the lowest applicable generic groundwater and soil criterion.

The lowest applicable criterion determines the need for response action unless a higher criterion can be justified by providing reliable exposure controls for the controlling pathway. In addition, special characteristics of the facility and/or contamination may require a greater degree of response action (e.g., hazardous substances are present which are documented to have interactive toxicological effects) (R 299.5728, R 299.5734(2)(3), and R 299.532(9)). In lieu of using generic criteria, less restrictive facility-specific generic or site-specific cleanup criteria may be proposed. If facility- or site-specific criteria are to be used in lieu of generic criteria, it is the responsibility of the person proposing the plan to adequately document the basis for the limited or site-specific cleanup criteria in any RAP (R 299.5732) or CAP.

**Types of Remedial Actions Under Part 201**

Section 20120a(1) of NREPA allows for the development of cleanup criteria and remedial actions in the following land use categories:

- a) generic and limited residential
- b) generic and limited commercial
- c) generic and limited industrial
- d) generic and limited recreational (*Generic recreational criteria have not been developed by the MDEQ. Recreational criteria are handled on a site-specific basis.*)





**Generic Remedial Actions:** Generic remedial actions are based on generic cleanup criteria for all relevant pathways for the facility in question. Generic residential remedial actions allow for the property to be used without any type of restriction. Generic industrial and commercial remedial actions require an assurance that the land use will continue to be consistent with the generic land use category. A Notice of Approved Environmental Remediation (NAER) for the property consistent with provisions of Section 20120b(2) filed with the Register of Deeds forms an acceptable assurance regarding land use for generic commercial and industrial remedial actions. RAPs must include a statement confirming that the expected activity patterns at the facility are consistent with the exposure assumptions used to calculate the applicable generic criteria. The RAP must also include documentation of the current zoning of the property and any legal nonconforming uses that are relevant to the RAP.

**Facility-Specific Generic Remedial Actions:** Facility-specific generic remedial actions are generic remedial actions, however, one or more of the generic criteria have been modified based upon characteristics of the property that are not expected to change, such as soil characteristics. Those criteria which incorporate soil parameters (soil volatilization to indoor air inhalation criteria (SVIIC), groundwater volatilization to indoor air inhalation criteria (GVIIC), generic volatile soil inhalation criteria for ambient air, generic particulate soil inhalation criteria for ambient air, generic soil saturation concentrations ( $C_{sat}$ ), and generic soil-water partitioning values) can be adjusted to incorporate facility-specific soil parameters and still allow the facility to satisfy the generic categorical criteria under Section 20120a(1)(a) to (e) of NREPA. Facility-specific measurements of the following parameters may be substituted individually for the generic assumptions and still allow the facility to satisfy the categorical criteria in Section 20120a(1)(a) to (e) of NREPA (R 299.5714(4), R 299.5724(4), and R 299.5726(7)):

- a) dry soil bulk density
- b) fraction of organic carbon in soil
- c) soil vapor permeability
- d) temperature adjustment factor for Henry's Law Constant
- e) source-building foundation separation distance (GVIIC only)
- f) vertical thickness of the capillary fringe (GVIIC only)
- g) vertical thickness of soil contamination (SVIIC only)
- h) emission due to wind (Ew) (soil inhalation criteria (SIC) only)
- i) dispersion factor (Q/C) (SIC only)

Adjustments to the source-building foundation separation distance and vertical thickness of the capillary fringe must be made in consideration of seasonal variation and meteorological conditions. Consult the appropriate TSD for details. Facility-specific generic industrial-commercial RAPs do not require any limitations or restrictions except a NAER.

**Site-Specific Remedial Actions:** Site-specific remedial actions may be acceptable under Part 201 Section 20120(a)(2). A site-specific remedial action utilizes cleanup criteria that are based on site-specific assumptions which are substituted for the default assumptions specified in the rules for the various cleanup criteria. However, the equations presented in the pertinent rule must be used to calculate the site-specific criteria (R 299.5706a(9)). Site-specific criteria are also developed for exposure pathways and scenarios for which generic methodology has not been developed. The following pathways are approached on a site-specific basis:

- a) recreational exposures/land uses
- b) sediments (R 299.5730)



c) surface water column (R 299.5730)

Use controls must be in place to assure that activities or characteristics of the facility continue unchanged into the future such that unacceptable exposures will not occur. In this respect, a site-specific closure is a type of limited remedial action. A RAP relying on site-specific cleanup criteria must include documentation of the current zoning of the property and any legal nonconforming uses that are relevant to the RAP. Except for response actions which meet generic residential criteria, site-specific response actions also apply to property that is not zoned. The site-specific RAP for property not zoned must include documentation of the reasonably foreseeable future use of the property and natural resources in question (R 299.5532(8)(b)). Because Section 20120a(6) constrains application of generic or limited categorical cleanup designations to cases where the category is consistent with zoning, a facility that is not zoned cannot be addressed under Section 20120a(1). For property not zoned, any remedial action that does not meet generic residential criteria is considered a site-specific remedial action under Section 20120a(2) of NREPA. In these cases, the generic criteria that correspond to the land use may still be used to assess the adequacy of the remedial action. The person proposing the plan must document the land use and include a statement in the RAP confirming that exposures associated with that land use at the facility do not exceed the exposures used to develop the generic criteria proposed to be applied. If a site-specific remedial action for unzoned property relies on generic cleanup criteria appropriate to the land use, land use restrictions in a form similar to a NAER (rather than a restrictive covenant) may be appropriate and, generally, other RAP elements of Section 20120b(3) may not be needed.

Limited Remedial Actions: A limited remedial action under Section 20120(a)(1)(e) through (h) is necessary whenever a use restriction is required, which is beyond those required to assure activities are consistent with the land use category being applied. The need for use restrictions is established by comparison of facility conditions to generic assumptions used in the generic criteria equations (in contrast to site-specific closures described above). A limited RAP requires a land use or natural resource use restriction or an institutional control such that unacceptable exposures to media exceeding acceptable cleanup criteria cannot occur, along with the other RAP elements of Section 20120b(3). The necessary restrictions must be provided in a *restrictive covenant consistent with the provisions of Section 20120b(4)* filed with the Register of Deeds for the county where the facility is located or provided with an institutional control consistent with the provisions of Section 20120b(5).

**Types of Closures Under Part 213**

The Michigan-specific risk-based corrective action approach utilizes a tiered evaluation to determine whether site conditions satisfy generic criteria or allow for the utilization of facility-specific data to adjust the generic criteria; or whether site-specific criteria or institutional controls allow for closure. Closure categories include:

- a) Tier 1 residential unrestricted closure
- b) Tier 1 commercial or industrial closure with Notice of Corrective Action (NoCA)
- c) Tier 2 or 3 residential, commercial, or industrial closure with site-specific criteria
- d) Tier 2 or 3 residential, commercial, or industrial closure with institutional controls

A description of the types of closures allowed under Part 213 follow:



Residential Unrestricted Closures: Under this type of closure, the site has been fully characterized and the closure is based on the generic residential criteria or applicable site-specific target levels (SSTLs) that are as protective as the generic residential criteria.

Commercial and Industrial Closures: Under commercial and industrial closures, the site has been fully characterized and the closure is based on the commercial or industrial generic criteria or applicable SSTLs that are as equally protective as the generic criteria. Commercial and industrial closures allow for the property to be used without any type of restriction except an assurance that the land use will continue to be consistent with the generic land use category. A NoCA on the property consistent with the provisions of Section 21310a(1) filed with the Register of Deeds for the county in which the property is located is acceptable assurance regarding applicable commercial or industrial land use.

Restricted Closures: In the case of restricted closures, the site contaminants exceed the generic criteria and use controls, exposure barriers, and/or restrictions need to be in place to control exposure to the contaminants of concern. These controls generally take the form of a restrictive covenant on all properties in the affected area consistent with the provisions of Section 21310a(2) filed with the Register of Deeds for the county in which the property is located. Section 21310a(3) also provides for alternative mechanisms that may be effective in protecting against unacceptable exposures.

#### **Land Use Categories Under Part 201 and Part 213**

Descriptions of residential, commercial, and industrial land use categories are presented below. This information can be used to identify the most appropriate land use category for a property. *Only the soil direct contact criteria have commercial III and IV subcategories.* With the exception of commercial subcategory I, all other criteria that are protective of the worker population are applied to both industrial and commercial land uses.

Residential Land Use Category: The primary activity of the property is residential and includes single family dwellings, condominiums, and apartment buildings. The generic residential remedial action allows the property to be used for any unrestricted use. The generic residential category can be applied to properties that are zoned commercial or industrial, unlike the industrial or commercial category which can only be applied to properties zoned industrial or commercial. The limited residential category cannot be applied to industrial or commercially zoned property.

Industrial and Commercial Land Use Categories: Activities and uses are extremely variable within the industrial and commercial land uses. It is the responsibility of the party proposing a remedy to identify the category of cleanup criteria that is being relied upon and to demonstrate that the facility and exposure setting is consistent with the characteristics of the land use category/subcategory and the cleanup criteria. Similarly, the party proposing the remedy will have to describe those measures that will be put in place (NAER, NoCA, etc.) to assure that the exposure setting of the facility is maintained consistent with the exposure characteristics of the category/subcategory. This will serve to assure that uses of the facility that might yield unacceptable exposures will be precluded in the future. Proper characterization of those facility-specific activities or exposures may warrant the use of generic criteria from another subcategory or category.



Industrial Land Use Category: Industrial land use includes both of the following two elements:

1. The primary activity at the property is and will continue to be industrial in nature (e.g., manufacturing, utilities, industrial research and development, petroleum bulk storage) and access is and will continue to be reliably restricted consistent with its use (e.g., by fences, security personnel, or both). Inactive or abandoned properties can be included in this category if the use was and/or will be industrial, as described above, and access is controlled as necessary to assure unacceptable exposures do not occur. The industrial category does not include farms, gasoline service stations, or other commercial establishments where children may commonly be present.
2. The current zoning of the property is industrial, the zoning is anticipated to be industrial (see below), or the RAP/CAP includes documentation that the current industrial use is a legal nonconforming use. This may include different zoning designations, depending on the community, such as "light industrial" or "heavy industrial." Documentation of zoning must be included in the RAP/CAP and must include a map or current property record card that shows the zoning status of the facility and all adjacent properties. For each designated zoning category, the documentation must also include the text of the zoning code or ordinance for that designation. If the text for the zoning category refers to any other categories, text for those categories must also be included. If the RAP/CAP is based on anticipated zoning changes, documentation of how and when the zoning changes are to be accomplished and that the proposed criteria are consistent with the new zoning designation must be provided. The MDEQ shall not grant final approval until a final determination of that zoning change has been made by the local unit of government. The RAP/CAP must identify the nearest current residential land uses and nearest properties which are zoned for residential use. Any legal nonconforming land uses in the vicinity of the facility must be identified in the RAP/CAP (e.g., residential use on a parcel zoned "transitional industrial").

Commercial Land Use Category: The commercial land use category is extremely varied, encompassing everything from day care centers and schools to gas stations and warehouse operations. The physical setting of commercial properties and the activities which workers and the general public engage in are also extremely variable. Given the breadth of the commercial land use category, it is impossible to assign a single set of "typical" or generic exposure assumptions to characterize the activities of all potentially exposed populations.

In order to facilitate the development of generic commercial criteria, all commercial land uses have been divided into four subcategories based on factors that are critical to the assessment of potential risk. These factors include the potentially exposed populations (workers or general public) and the nature, duration, and frequency of the exposures likely to occur when people occupy, work, visit, or patronize the facility. The division of the commercial land use category into subcategories allows for some useful generalizations to be made.

Some commercial properties may be located in or near residential areas and, therefore, may be used by other populations for purposes (e.g., recreational) other than the intended commercial use. It may be inappropriate to apply the generic criteria developed for a given subcategory of commercial land use if anticipated exposure from noncommercial, unintended uses (e.g., children playing) exceeds the exposures assumed under that subcategory. Adjustments can be made to the exposure assumptions to represent these other uses consistent with the applicable rule provisions, or criteria for a more representative category can be used. Adjustments to the



exposure assumptions may require site-specific remedial action under Section 20120a(2). Alternatively, the RAP/CAP may denote measures designed to preclude uses inconsistent with the exposure assumptions used to develop the criteria.

For the purpose of determining if the generic commercial criteria presented in Attachment 1 are applicable, the party proposing a remedy must first determine that the facility falls within the definition of commercial land use and that the facility-related exposures are similar to those assumed for this category. The definition of commercial land use includes both of the following two elements:

1. The primary activity at the property is and will continue to be commercial in nature (e.g., retail, warehouse, office/business space). This could include abandoned or inactive commercial properties as long as they fit both the definition of a commercial land use and one of the subcategory definitions described below.
2. The current zoning of the property is commercial, future zoning is anticipated to be commercial, or the RAP/CAP includes documentation that the current commercial use is a legal nonconforming use. This may include different zoning designations, depending on the community, such as "community commercial," "regional commercial," "retail," or "office/business." Documentation of zoning must be included in the RAP/CAP and must include a map or current property record card that shows the zoning status of the facility and all adjacent properties. For each designated zoning category, the documentation must also include the text of the zoning code or ordinance for that designation. If the text for the zoning category refers to any other categories, text for those categories must also be included. If the RAP/CAP is based on anticipated zoning changes, documentation of how and when the zoning changes are to be accomplished and that the proposed criteria are consistent with the new zoning designation must be provided. Final MDEQ approval is dependent upon a final determination of the zoning change by the local unit of government. The RAP/CAP must identify the nearest current residential land uses and nearest parcels which are zoned for residential use. Any nonconforming land uses in the vicinity of the property must be identified in the RAP/CAP (e.g., residential use on a parcel zoned "transitional commercial").

***Caution should be used when categorizing land uses on the basis of business type. Activities may vary considerably even among businesses of the same type. Current and future activities and exposures should be the primary considerations when determining a land use category for a specific facility.***

If the property meets the definition of commercial land use, the party proposing the remedy must document which of the four subcategories of commercial land use defined below is most representative of the exposure setting of the subject property. The subcategories and the features that define them are described below:

Subcategory I: This commercial land use subcategory is characterized by any use which is intended to house, educate, or provide care for children, the elderly, the infirm, or other sensitive subpopulations. The activities engaged in by these populations at the facility are characterized by exposures of relatively significant duration and/or frequency approximating the magnitude of exposures used to develop the residential criteria. The setting may include areas containing surficial soils that may be frequented by potentially exposed populations (e.g., play areas). Any soil contaminants present may, therefore, be readily accessible to the resident populations. If relied on for drinking water, exposure to groundwater would also be significant. In addition, this



subcategory of commercial land use is usually, but not always, located in or near residential areas and, therefore, may be used by other populations for purposes other than the intended commercial use (e.g., recreational). This subcategory could include, but is not limited to, the following uses:

- a) day care centers
- b) any form of educational facility
- c) hospitals, elder care facilities, and nursing homes

Although a site-specific risk assessment may be conducted on properties within this category, no generic commercial cleanup criteria will be developed because in most cases, the site setting and uses will warrant the application of generic residential criteria. There are forms of subcategory I commercial land use that do not possess the exposure characteristics of the residential exposure setting; for example, long-term or convalescent care facilities where patients are not expected to come into contact with soils on a frequent basis. In such cases, site-specific cleanup criteria or criteria from another subcategory can be utilized with proper written documentation.

Subcategory II: The degree of exposure for such employees under subcategory II property is assumed to be equivalent to the exposures used to model outdoor activities in the development of the generic industrial criteria. As a result, a unique set of generic criteria has not been defined for this subcategory of commercial land use. Properties that fall into this subcategory should be addressed through the application of the generic industrial criteria or through a site-specific risk assessment.

This commercial land use subcategory is characterized by the following features. Access to the public is reliably restricted, consistent with its use by fences, security, or both. Affected surficial soils are located in unpaved or landscaped areas that are frequently contacted by worker populations such as groundskeepers, maintenance workers, or other employees whose primary duties are performed outdoors. If groundwater is relied on for drinking water, it is assumed that worker populations receive one-half of their total daily drinking water exposure from the facility.

This subcategory could include, but is not limited to, the following uses:

- a) large scale commercial warehouse operations
- b) wholesale lumber yards
- c) building supply warehouses

Subcategory III (low soil intensive): A worker whose primary duties take place indoors but also include some outdoor activities such as collecting trash is the receptor for this subcategory. A subcategory III commercial property is characterized by the following features. Access to the public is unrestricted, however, the general public's occupancy of the property is expected to be intermittent and significantly less in frequency and duration relative to the population working at the facility. Although some of the activities for both worker populations and the general public at a subcategory III commercial property are conducted indoors, a significant component of their activity will likely be outdoors. The worker/receptor population at these commercial facilities is expected to engage in low soil intensive activities. Routine outdoor tasks performed by these workers are unlikely to result in significant physical interaction with the soil. Affected surficial soils may be contacted, primarily by the worker populations (as may be the cases at gas stations, auto dealerships, or building supply warehouses with unpaved areas). If on-site groundwater is relied on for drinking water, it is assumed that worker populations receive one-half of their total daily



drinking water exposure from the facility. The receptors for this subcategory are expected to work at the kinds of establishments that are listed below and conducting activities that take place both indoors and outdoors.

This subcategory could include, but is not limited to, the following uses:

- a) retail gas stations
- b) auto service stations
- c) auto dealerships
- d) retail warehouses selling the majority of their merchandise indoors but including some limited storage or stockpiling of materials in an outdoor yard (building supply, retail flower, and garden shops not involving on-site plant horticulture and excluding open air nurseries, tree farms, and sod farms which would fall into an agricultural land use).
- e) repair and service establishments including but not limited to, lawn mower, boat, snowmobile, or small appliance repair shops that have small outdoor yards.
- f) small warehouse operations

Subcategory IV (high soil intensive): A groundskeeper worker population has been identified as the appropriate receptor population for development in this subcategory. The worker/receptor population at these commercial facilities is expected to engage in high soil intensive activities. The primary tasks performed by these workers will result in significant physical interaction with the soil.

A subcategory IV commercial property is characterized by the following features. Access to the public is unrestricted, however, the general public's occupancy of the facility is intermittent in frequency and of short duration relative to the worker populations at the facility (i.e., the frequency and duration of general public occupancy at the property is typified by the time necessary to transact business at a retail establishment or to receive personal services). At least a portion of the worker population at this type of commercial property conducts most of their work activities outdoors; this includes those workers from off-site who work at multiple properties such as commercial landscapers. General public contact with these areas is anticipated to be significantly less than the worker's contact, both in terms of frequency and duration. If groundwater is relied upon for drinking water, worker populations would receive one-half of their total daily drinking water exposure at the facility. This subcategory could include, but is not limited to, the following uses where landscaping exists or has the potential to exist:

- a) professional offices (lawyers, architects, engineers, real estate, insurance, etc.)
- b) medical/dental offices and clinics (not including hospitals)
- c) banks, credit unions, savings and loan institutions, etc.
- d) publicly owned office buildings
- e) any retail business whose principal activity is the sale of food or merchandise within an enclosed building
- f) personal service establishments which perform services indoors (health clubs, barber/beauty salons, mortuaries, photographic studios, etc.)

#### **CONCERNS NOT ADDRESSED BY CLEANUP CRITERIA**

*There are several concerns that have not been addressed with generic cleanup criteria, and as a result, they must be addressed in a RAP/CAP. These concerns are listed and discussed below.*



**Source Control:** Free-phase liquids and abandoned hazardous substances not yet dispersed represent source materials that have the potential to cause harm to public health, natural resources, and the environment. Source removal often provides the greatest opportunity to permanently and significantly reduce volume, toxicity, and mobility of hazardous substances as specified in Section 20118(4). All RAPs must include an analysis of source control measures already implemented, proposed, or both (Section 20118(8), R 299.5532(7)). Also, for persons that are liable and owned or operated the facility after June 5, 1995, there are additional requirements related to source control specified in Section 20114. Under Part 213, if free product is discovered, it must be reported within 24 hours of the discovery. Section 21307(2)(c)(i) requires that free product removal be conducted in a manner that minimizes the spread of contamination into previously uncontaminated zones. In addition, Section 21307(2)(c)(ii) requires the abatement of free product migration as a minimum objective for the design of the free product removal system. The extent of the free product must be defined to adequately demonstrate that the free product is not migrating and that contamination is not spreading into previously uncontaminated areas. Delineation of the free product must be completed and removal of free product initiated within 90 days of its discovery. Interim recovery methods must be initiated immediately upon discovery of the free product.

**Contaminated Soil Runoff to Surface Waters:** Consideration must be given to the potential for contaminated soil to erode into surface water, and if the potential exists, what response activity may be appropriate (R 299.5532(7)(x)). This concern is relevant for all land uses. It is applicable to facilities where significant potential exists for contaminated soil to reach surface water via direct transport or runoff. The following should be considered in determining whether the transport of contaminated soil to surface waters is a relevant pathway:

- a) proximity to surface waters
- b) extent of exposed and/or erodible soils
- c) extent of erodible contamination
- d) transport or erosion potential based on soil types, compaction, and slope
- e) presence in soil of metals or persistent bioaccumulative chemicals

If this pathway is determined to be relevant, then the following should be considered in determining if the pathway is or will be adequately controlled pursuant to a RAP/CAP:

- a) whether vegetation is adequate and not expected to require maintenance (this would not require a limited closure)
- b) whether an impervious surface or another engineering measure is required to provide adequate control of potential runoff (this would require a limited closure)

If the pathway is relevant, then the RAP/CAP must provide for effective control of the erosion of contaminated soil. Compliance with Part 201/Part 213 should be considered in judging the effectiveness of the control measures.

**Surface Water Sediments:** Contaminated surface water sediments can cause adverse impacts to aquatic flora or fauna, the food chain, or aesthetics. If this potential exists, the pathway is relevant (R 299.5532(7)(xii)). This pathway has the potential to be relevant for all land uses. Any RAP/CAP that addresses surface water or sediments must include site-specific cleanup criteria based on the evaluation of bulk sediment chemistry, sediment toxicity, and benthic community populations. Additional guidance is available in RRD Operational Memorandum No. 4, Attachment 3. Development of the criteria must also include consideration





of the following use impairments such that those impairments are eliminated or mitigated following implementation of the criteria (R 299.5730).

- a) restrictions on fish or wildlife consumption
- b) tainting of fish and wildlife flavor
- c) degraded fish or wildlife populations
- d) fish tumors or other deformities
- e) bird or animal deformities or reproductive problems
- f) degradation of benthos
- g) restrictions on dredging activities
- h) eutrophication or undesirable algae
- i) restrictions on drinking water consumption, taste, or odor problems
- j) beach closings
- k) degradation of aesthetics
- l) added costs to agriculture or industry, or a local unit of government
- m) degradation of phytoplankton or zooplankton populations
- n) loss of fish and wildlife habitat
- o) unacceptable risk through human contact as a result of absorption of hazardous substances through the skin or by incidental ingestion of sediments
- p) other unacceptable risks to human receptors exposed to hazardous substances in sediments

#### **Acute Toxicity and Physical Hazards**

Acute toxicity and physical hazards need to be considered at every facility. Acute inhalation toxicity and flammability/explosivity potential have been addressed via development of FESLs and AISLs for a limited number of hazardous substances where sufficient chemical-specific information is available (Attachment 10). When FESLs/AISLs cannot be developed, an evaluation for flammability/explosivity and acute inhalation toxicity will need to be conducted on a case-by-case basis. In addition, other physical hazards must be evaluated for groundwater (R 299.5532(7)(xiv)). Since AISLs and FESLs have not been developed for soil, it may be necessary to give special consideration to these hazards in soil.

Acute toxicity to aquatic organisms must also be considered. Specific response activities are required if there is a release to surface waters, either directly or through venting groundwater that is acutely toxic (R 299.5526(4)(d) and R 299.5716(14)). Contaminant-specific values for acute toxicity to aquatic life are listed in the R 323.1057 Water Quality Values (available at [www.michigan.gov/deq](http://www.michigan.gov/deq) select "Water," "Water Quality Monitoring," "Assessment of Michigan Waters").

Some of the hazardous substances in the criteria tables may present other physical hazards such as ignitability, corrosivity, or reactivity. These substances were identified using the definitions provided in the Resource Conservation and Recovery Act (RCRA; 40 Code of Federal Regulations, Sections 261.20-261.23). Substances which have the hazardous properties of ignitability, corrosivity, or reactivity when in pure form are footnoted in the criteria tables with an (I), (U), or (R), respectively. Further information about these characteristics follows below. Special attention and caution must be exercised when these hazardous substances are known or expected to be present in soil and/or groundwater. Additional hazardous substances listed in the criteria tables may also pose acute or physical hazards that may need to be addressed.

Hazardous substances that are ignitable in pure form may present a combustion hazard under normal environmental conditions (i.e., standard temperature and pressure) and/or may be strong oxidizers capable of exacerbating a fire once ignited. Corrosive substances have either a very high or a very low pH, destroy living tissue upon direct contact, corrode or destroy building materials or other equipment, and mobilize other hazardous substances. Reactive substances may explode under normal environmental conditions when exposed to moisture or when subject to an initiating force. Reactive substances may also generate toxic fumes as is the case for cyanide or sulfide containing substances. All physical and acute hazards need to be evaluated on a case-by-case basis.

**Ecological and Aesthetic Impacts:** Additional impacts that need to be considered are aesthetics, phytotoxicity, food web contamination, adverse impacts to soil organisms, and adverse impacts to aquatic and terrestrial wildlife (R 299.5532(7)(xv), R 299.5728). Observable evidence of a problem including, but not limited to, soil discoloration, odors, stressed vegetation, and injured wildlife requires that further evaluation of aesthetic and/or ecological impacts occur. In addition, certain hazardous substances such as dioxins, furans, and polychlorinated biphenyl (PCB) compounds present their greatest ecological impacts in reduced reproductive success, embryo survival, and contaminant biomagnification through the food web. These impacts are generally not visibly evident, but these ecological impacts are very significant and must also be evaluated to ensure that the proposed remedy is adequately protective of the environment.

The GSI criteria do consider certain impacts to some aquatic organisms, in addition to human health effects. However, Part 201 generic criteria do not fully address ecological impacts. In addition, only a few criteria account for adverse aesthetic impacts, and this is complicated by the fact that the presence of multiple contaminants may result in aesthetic impacts that would not otherwise be observed or expected. Consequently, aesthetic-based criteria and ecologic-based criteria may need to be developed. The development of these criteria is made difficult because only limited quantitative information currently exists in the published literature. As a result, professional judgment may be required.

The generic criteria for soil do not fully address aesthetic impacts. Soils which are in compliance with the appropriate health-based chemical-specific criteria, yet still exhibit adverse aesthetic impacts, must be addressed on a case-by-case basis. In determining if additional action is required for soils with adverse aesthetic impacts, consideration will be given to the intended use of the property, the depth of the impacted soils, the source of the contamination, and the specific aesthetic impacts exhibited in the soil.

Generic ecologic-based soil or sediment criteria have not been established by the MDEQ. Nonetheless, it is important that all RAPs/CAPs consider the need for conducting ecological risk assessment at the facility. Ecological risk assessments are useful to define the risks to aquatic and/or terrestrial wildlife that are posed by the contaminant concentrations present at the facility. The presence of bioaccumulative contaminants is of particular concern. These contaminants include, but are not limited to, chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, hexachlorobenzene, hexachlorobutadiene, hexachlorocyclohexanes, alpha-hexachlorobenzene, beta-hexachlorocyclohexane, delta-hexachlorocyclohexane, lindane, mercury, mirex, octachlorostyrene, PCBs, pentachlorobenzene, photomirex, dioxins (2,3,7,8-tetrachlorodibenzo-p-dioxin being the most toxic congener), furans (2,3,7,8-tetrachlorodibenzo-p-furans being the most toxic congener), 1,2,3,4-tetrachlorobenzene, 1,2,4,5-tetrachlorobenzene, and toxaphene.



In most cases, it is important that some form of ecological risk assessment be conducted when aquatic and/or terrestrial habitat(s) will remain at a facility after completion of the RAP/CAP construction activities. In most instances, the initial form of this assessment effort will be what is generally referred to as a prescreening, or screening level, ecological risk assessment. A prescreening risk assessment must examine whether there will be an unacceptable risk to organisms expected to live in habitats located at or near the facility. If unacceptable, ecological risks cannot be ruled out at the facility, then some additional action will be necessary. This additional action could lead to the completion of a more detailed ecological risk assessment involving definition of habitats, identification of receptor species, review of available ecological risk data, food chain modeling, and potentially the collection and analysis of biological samples. This additional assessment effort could eventually lead to the development of ecologically-based criteria at the facility. Alternatively, presumptive actions can be implemented to prevent unacceptable ecological exposures at the facility (e.g., capping or otherwise isolating the contaminants from ecological exposure, or removal of the contaminant). It may be more cost effective to implement presumptive remedies than to conduct a detailed ecological risk assessment.

To assist in conducting or evaluating screening level ecological assessments, the ecological screening level guidance document, dated August 22, 2003, prepared for the U.S. EPA Region 5 RCRA Corrective Action and Permit Program office (<http://www.epa.gov/RCRIS-Region-5/ca/ESL.pdf>) is recommended. The document provides comparison concentration values for a variety of chemical compounds in air, water, sediment, and soil. If concentrations at a facility clearly and consistently exceed these comparison values for the environmental media of concern, then unacceptable ecological risk cannot be ruled out at the facility.

For those facilities regulated under Part 111, Hazardous Waste Management, of NREPA, additional response activities to address ecological risk may be required to assure consistency with the Federal RCRA Program. Please contact the WHMD, Hazardous Waste and Radiological Protection Section for additional information.



Remediation and  
Redevelopment Division

**Michigan Department of Environmental Quality**

For questions concerning the criteria/RBSL tables, criteria/RBSL development, or the technical support documents, please contact Christine Flaga, MDEQ, RRD Toxicology Unit Chief, at 517-373-0160, or [flagac@michigan.gov](mailto:flagac@michigan.gov). For questions regarding application of the criteria or RBSLs to specific sites, please contact the appropriate project manager.

A handwritten signature in black ink, appearing to read "Andrew W. Hogarth", written over a horizontal line.

Andrew W. Hogarth, Chief  
Remediation and Redevelopment Division

Dated: 12/10/04



**TABLE 2. SOIL: RESIDENTIAL AND COMMERCIAL I  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to one microgram per kilogram (ug/kg). Criteria with six or more digits are expressed in scientific notation. For example, 200,000 ppb is presented as 2.0E+5. The lowest generic soil criterion for a given hazardous substance is presented in a bold box. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (R 299.5707). In these cases, two numbers are presented in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value. Criteria were promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. These tables reflect modifications to the TDLs and new criteria consistent with the provisions of R299.5103(l) and R299.5706a, respectively.

			Groundwater Protection			Indoor Air	Ambient Air (Y)				Direct Contact	
Guidesheet Number →		#10	#11	#12	#13	#14	#15	#16	#17	#18	#19	#20
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Direct Contact Criteria & RBSLs	Soil Saturation Concentration Screening Levels
Acenaphthene	83329	NA	3.0E+5	4,400	9.7E+5	1.9E+8	8.1E+7	8.1E+7	8.1E+7	1.4E+10	4.1E+7	NA
Acenaphthylene	208968	NA	5,900	ID	4.4E+5	1.6E+6	2.2E+6	2.2E+6	2.2E+6	2.3E+9	1.6E+6	NA
Acetaldehyde (I)	75070	NA	19,000	2,600	1.1E+8 (C)	2.2E+5	1.7E+5	1.7E+5	2.8E+5	6.0E+8	2.9E+7	1 1E+8
Acetate	71501	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Acetic acid	64197	NA	84,000	3.6E+5	6.5E+8 (C)	NLV	NLV	NLV	NLV	1 7E+10	1.3E+8	6.5E+8
Acetone (I)	67641	NA	15,000	34,000	1.1E+8 (C)	1.1E+8 (C)	1.3E+8	1.3E+8	1.9E+8	3.9E+11	2.3E+7	1.1E+8
Acetonitrile	75058	NA	2,800	NA	2.2E+7 (C)	4.8E+6	1.6E+6	1.6E+6	2.1E+6	4.0E+9	4.3E+6	2.2E+7
Acetophenone	98862	NA	30,000	NA	1.1E+6 (C)	1.1E+6 (C)	4.4E+7	4.4E+7	4.4E+7	3.3E+10	1.1E+6 (C)	1.1E+6
Acrolein (I)	107028	NA	2,400	NA	2.3E+7 (C)	410	310	310	610	1.3E+6	3.6E+6	2.3E+7
Acrylamide	79061	NA	10	NA	2.6E+5	NLV	NLV	NLV	NLV	2.4E+6	1,900	NA
Acrylic acid	79107	NA	78,000	NA	1.1E+8 (C)	2.4E+6	1.9E+5	2.3E+5	2.3E+5	6.7E+7	3.5E+7 (DD)	1.1E+8
Acrylonitrile (I)	107131	NA	100 (M); 52	100 (M,X); 98	2.8E+5	6,600	5,000	5,100	10,000	4.6E+7	16,000	8.3E+6
Alachlor	15972608	NA	52	290 (X)	44,000	NLV	NLV	NLV	NLV	ID	93,000	NA
Aldicarb	116063	NA	60	NA	2.4E+6	NLV	NLV	NLV	NLV	ID	2.3E+5	NA
Aldicarb sulfoxide	1646873	NA	200 (M)	NA	5.4E+7	NLV	NLV	NLV	NLV	ID	2.9E+5	NA
Aldicarb sulfone	1646884	NA	200 (M); 40	NA	4.2E+7	NLV	NLV	NLV	NLV	ID	2.5E+5	NA
Aldrin	309002	NA	NLL	NLL	NLL	1.3E+6	58,000	58,000	58,000	6.4E+5	1,000	NA
Aluminum (B)	7429905	6.9E+6	1,000	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	5.0E+7 (DD)	NA
Ammonia	7664417	NA	ID	(CC)	ID	ID	ID	ID	ID	6.7E+9	ID	1.0E+7

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**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

All criteria, unless otherwise noted, are expressed in units of parts per billion (ppb). One ppb is equivalent to one microgram per kilogram (ug/kg). Criteria with six or more digits are expressed in scientific notation. For example, 200,000 ppb is presented as 2.0E+5. A footnote is designated by a letter in parentheses and is explained in the footnote pages that follow the criteria tables. When the risk-based criterion is less than the target detection limit (TDL), the TDL is listed as the criterion (R 299.5707). In these cases, two numbers are presented in the cell. The first number is the criterion (i.e., TDL), and the second number is the risk-based value. Criteria were promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. These tables reflect modifications to the TDLs and new criteria consistent with the provisions of R299.5103(l) and R299.5706a, respectively.

Guidesheet Number →			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
			#10	#21	#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Acenaphthene	83329	NA	3.0E+5	8.8E+5	4,400	9.7E+5	3.5E+8	9.7E+7	9.7E+7	9.7E+7	6.2E+9	1.3E+8	1.8E+8	1.5E+8	NA
Acenaphthylene	208968	NA	5,900	17,000	ID	4.4E+5	3.0E+6	2.7E+6	2.7E+6	2.7E+6	1.0E+9	5.2E+6	7.2E+6	6.1E+6	NA
Acetaldehyde (I)	75070	NA	19,000	54,000	2,600	1.1E+8 (C)	4.0E+5	2.1E+5	2.1E+5	2.9E+5	2.6E+8	9.5E+7	1.1E+8 (C)	1.1E+8	1.1E+8
Acetate	71501	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID
Acetic acid	64197	NA	84,000	2.4E+5	3.6E+5	6.5E+8 (C)	NLV	NLV	NLV	NLV	7.4E+9	4.2E+8	5.8E+8	4.9E+8	6.5E+8
Acetone (I)	67641	NA	15,000	42,000	34,000	1.1E+8 (C)	1.1E+8 (C)	1.6E+8	1.6E+8	2.0E+8	1.7E+11	7.3E+7	1.0E+8	8.6E+7	1.1E+8
Acetonitrile	75058	NA	2,800	8,000	NA	2.2E+7 (C)	8.8E+6	1.9E+6	1.9E+6	2.2E+6	1.8E+9	1.4E+7	1.9E+7	1.6E+7	2.2E+7
Acetophenone	98862	NA	30,000	88,000	NA	1.1E+6 (C)	1.1E+6 (C)	5.2E+7	5.2E+7	5.2E+7	1.4E+10	1.1E+6 (C)	1.1E+6 (C)	1.1E+6 (C)	1.1E+6
Acrolein (I)	107028	NA	2,400	6,600	NA	2.3E+7 (C)	760	370	370	630	5.9E+5	1.2E+7	1.6E+7	1.4E+7	2.3E+7
Acrylamide	79061	NA	10	10	NA	2.6E+5	NLV	NLV	NLV	NLV	3.0E+6	8,700	12,000	10,000	NA
Acrylic acid	79107	NA	78,000	2.2E+5	NA	1.1E+8 (C)	5.5E+6	2.2E+5	2.7E+5	2.7E+5	2.9E+7	1.1E+8 (C,DD)	1.1E+8 (C,DD)	1.1E+8 (C,DD)	1.1E+8
Acrylonitrile (I)	107131	NA	100 (M); 52	220	100 (M,X); 98	2.8E+5	35,000	17,000	17,000	31,000	5.8E+7	74,000	1.0E+5	87,000	8.3E+6
Alachlor	15972608	NA	52	52	290 (X)	44,000	NLV	NLV	NLV	NLV	ID	3.9E+5	6.9E+5	5.1E+5	NA
Aldicarb	118063	NA	60	60	NA	2.4E+6	NLV	NLV	NLV	NLV	ID	7.3E+5	1.0E+6	8.6E+5	NA
Aldicarb sulfoxide	1646873	NA	200 (M)	200 (M)	NA	5.4E+7	NLV	NLV	NLV	NLV	ID	9.5E+5	1.3E+6	1.1E+6	NA
Aldicarb sulfone	1646884	NA	200 (M); 40	200 (M); 40	NA	4.2E+7	NLV	NLV	NLV	NLV	ID	8.0E+5	1.1E+6	9.4E+5	NA
Aldrin	309002	NA	NLL	NLL	NLL	NLL	7.1E+6	2.0E+5	2.0E+5	2.0E+5	8.0E+5	4,300	7,700	5,600	NA
Aluminum (B)	7429905	6.9E+6	1,000	1,000	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	3.7E+8 (DD)	4.1E+8 (DD)	3.9E+8 (DD)	NA
Ammonia	7664417	NA	ID	ID	(CC)	ID	ID	ID	ID	ID	2.9E+9	ID	ID	ID	1.0E+7



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
t-Amyl methyl ether (TAME)	994058	NA	3,900	3,900	NA	4.4E+5 (C)	1.1E+5	4.0E+5	7.8E+5	1.8E+6	1.8E+9	4.4E+5 (C)	4.4E+5 (C)	4.4E+5 (C)	4.4E+5
Aniline	62533	NA	1,100	4,400	330 (M); 80	2.8E+6	NLV	NLV	NLV	NLV	2.9E+7	1.5E+6	2.1E+6	1.8E+6	4.5E+6
Anthracene	120127	NA	41,000	41,000	ID	41,000	1.0E+9 (D)	1.6E+9	1.6E+9	1.6E+9	2.9E+10	7.3E+8	1.0E+9	8.6E+8	NA
Antimony	7440360	NA	4,300	4,300	94,000	4.9E+7	NLV	NLV	NLV	NLV	5.9E+6	6.7E+5	7.3E+5	7.0E+5	NA
Arsenic	7440382	5,800	4,600	4,600	70,000 (X)	2.0E+6	NLV	NLV	NLV	NLV	9.1E+5	37,000	46,000	41,000	NA
Asbestos (BB)	1332214	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.0E+7 (M); 85,000	ID	ID	ID	NA
Alrazine	1912249	NA	60	60	150 (X)	1.1E+5	NLV	NLV	NLV	NLV	ID	3.3E+5 (DD)	4.6E+5 (DD)	3.9E+5 (DD)	NA
Azobenzene	103333	NA	4,200	17,000	NA	3.0E+5	3.2E+7	2.1E+6	ID	ID	1.3E+8	6.6E+5	9.2E+5	7.7E+5	NA
Banum (B)	7440393	75,000	1.3E+6	1.3E+6	(G,X)	1.0E+9 (D)	NLV	NLV	NLV	NLV	1.5E+8	1.3E+8	1.5E+8	1.4E+8	NA
Benzene (I)	71432	NA	100	100	4,000 (X)	2.2E+5	8,400	45,000	99,000	2.3E+5	4.7E+8	4.0E+5 (C)	4.0E+5 (C)	4.0E+5 (C)	4.0E+5
Benzidine	92875	NA	1,000 (M); 6.0	1,000 (M); 6.0	ID	1,000 (M); 140	NLV	NLV	NLV	NLV	59,000	1,000 (M); 110	1,000 (M); 150	1,000 (M); 120	NA
Benzo(a)anthracene (Q)	56553	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	80,000	1.6E+5	1.1E+5	NA
Benzo(b)fluoranthene (Q)	205992	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	80,000	1.6E+5	1.1E+5	NA
Benzo(k)fluoranthene (Q)	207089	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	8.0E+5	1.6E+6	1.1E+6	NA
Benzo(g,h,i)perylene	191242	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	3.5E+8	7.0E+6	1.4E+7	9.5E+6	NA
Benzo(a)pyrene (Q)	50328	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.9E+6	8,000	16,000	11,000	NA
Benzoic acid	65850	NA	6.4E+5	1.8E+6	NA	7.0E+7	NLV	NLV	NLV	NLV	ID	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Benzyl alcohol	100516	NA	2.0E+5	5.8E+5	NA	5.8E+6 (C)	NLV	NLV	NLV	NLV	1.5E+11	5.8E+6 (C)	5.8E+6 (C)	5.8E+6 (C)	5.8E+6
Benzyl chloride	100447	NA	150	640	NA	72,000	33,000	48,000	48,000	52,000	7.8E+7	2.2E+5	2.3E+5 (C)	2.3E+5 (C)	2.3E+5
Beryllium	7440417	NA	51,000	51,000	(G)	1.0E+9 (D)	NLV	NLV	NLV	NLV	5.9E+5	1.6E+6	1.6E+6	1.6E+6	NA
bis(2-Chloroethoxy)ethane	112265	NA	ID	ID	ID	ID	NLV	NLV	NLV	NLV	ID	ID	ID	ID	2.7E+6
bis(2-Chloroethyl)ether (I)	111444	NA	100	170	300	1.1E+5	44,000	13,000	13,000	13,000	1.2E+7	58,000	81,000	68,000	2.2E+6
bis(2-Ethylhexyl)phthalate	117817	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	8.9E+8	1.0E+7 (C)	1.0E+7 (C)	1.0E+7 (C)	1.0E+7
Boron (B)	7440428	NA	10,000	10,000	38,000	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	3.5E+8 (DD)	3.9E+8 (DD)	3.7E+8 (DD)	NA





**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

Guidesheet Number →			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
#10			#21	#12	#13		#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Bromate	15541454	NA	200	200	800	96,000	NLV	NLV	NLV	NLV	ID	91,000	99,000	95,000	NA
Bromobenzene (I)	108861	NA	550	1,500	NA	3.6E+5	5.8E+5	5.4E+5	5.4E+5	5.4E+5	2.4E+8	7.6E+5 (C)	7.6E+5 (C)	7.6E+5 (C)	7.6E+5
Bromodichloromethane	75274	NA	1,600 (W)	1,600 (W)	ID	2.8E+5	6,400	31,000	31,000	57,000	1.1E+8	4.9E+5	6.8E+5	5.7E+5	1.5E+6
Bromoform	75252	NA	1,600 (W)	1,600 (W)	ID	8.7E+5 (C)	7.7E+5	3.1E+6	3.1E+6	3.1E+6	3.6E+9	8.7E+5 (C)	8.7E+5 (C)	8.7E+5 (C)	8.7E+5
Bromomethane	74839	NA	200	580	700	1.4E+6	1,600	13,000	57,000	1.4E+5	1.5E+8	1.0E+6	1.4E+6	1.2E+6	2.2E+6
n-Butanol (I)	71363	NA	19,000	54,000	NA	8.7E+6 (C)	NLV	NLV	NLV	NLV	1.0E+10	8.7E+6 (C)	8.7E+6 (C)	8.7E+6 (C)	8.7E+6
2-Butanone (MEK) (I)	78933	NA	2.6E+5	7.6E+5	44,000	2.7E+7 (C)	2.7E+7 (C)	3.5E+7	3.5E+7	3.6E+7	2.9E+10	2.7E+7 (C,DD)	2.7E+7 (C,DD)	2.7E+7 (C,DD)	2.7E+7
n-Butyl acetate	123864	NA	11,000	32,000	NA	1.1E+6 (C)	1.1E+6 (C)	1.4E+8	3.1E+8	3.5E+8	2.1E+11	1.1E+6 (C)	1.1E+6 (C)	1.1E+6 (C)	1.1E+6
t-Butyl alcohol	75650	NA	78,000	2.2E+5	NA	1.1E+8 (C)	1.1E+8 (C)	1.2E+8	2.4E+8	2.4E+8	5.6E+10	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Butyl benzyl phthalate	85687	NA	3.1E+5 (C)	3.1E+5 (C)	26,000 (X)	3.1E+5 (C)	NLV	NLV	NLV	NLV	2.1E+10	3.1E+5 (C)	3.1E+5 (C)	3.1E+5 (C)	3.1E+5
n-Butylbenzene	104518	NA	1,600	4,600	ID	1.2E+5	ID	ID	ID	ID	ID	8.0E+6	1.0E+7 (C)	9.4E+6	1.0E+7
sec-Butylbenzene	135988	NA	1,600	4,600	ID	88,000	ID	ID	ID	ID	ID	8.0E+6	1.0E+7 (C)	9.4E+6	1.0E+7
t-Butylbenzene (I)	98066	NA	1,600	4,600	NA	1.8E+5	ID	ID	ID	ID	ID	8.0E+6	1.0E+7 (C)	9.4E+6	1.0E+7
Cadmium (B)	7440439	1,200	6,000	6,000	(G,X)	2.3E+8	NLV	NLV	NLV	NLV	2.2E+6	2.1E+6	2.1E+6	2.1E+6	NA
Camphene (I)	79925	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	NA
Caprolactam	105602	NA	1.2E+5	3.4E+5	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	2.9E+8	3.1E+8 (DD)	4.8E+8 (DD)	3.8E+8 (DD)	NA
Carbaryl	63252	NA	14,000	40,000	NA	2.6E+6	ID	ID	ID	ID	ID	7.0E+7	9.8E+7	8.2E+7	NA
Carbazole	86748	NA	9,400	39,000	1,100	8.2E+5	NLV	NLV	NLV	NLV	ID	2.4E+6	3.4E+6	2.9E+6	NA
Carbofuran	1563662	NA	800	800	NA	6.8E+6	NLV	NLV	NLV	NLV	ID	3.6E+6	5.1E+6	4.3E+6	NA
Carbon disulfide (I,R)	75150	NA	16,000	46,000	ID	2.8E+5 (C)	1.4E+5	1.6E+6	8.0E+6	1.9E+7	2.1E+10	2.8E+5 (C,DD)	2.8E+5 (C,DD)	2.8E+5 (C,DD)	2.8E+5
Carbon tetrachloride	56235	NA	100	100	900 (X)	92,000	990	12,000	34,000	79,000	1.7E+8	3.9E+5 (C)	3.9E+5 (C)	3.9E+5 (C)	3.9E+5
Chlordane (J)	57749	NA	NLL	NLL	NLL	NLL	5.9E+7	4.2E+6	4.2E+6	4.2E+6	2.1E+7	1.5E+5	2.0E+5	1.7E+5	NA
Chloride	16887006	NA	5.0E+6	5.0E+6	2.5E+6 (X)	ID	NLV	NLV	NLV	NLV	ID	5.0E+5 (F)	5.0E+5 (F)	5.0E+5 (F)	NA
Chlorobenzene (I)	108907	NA	2,000	2,000	940	2.6E+5 (C)	2.2E+5	9.2E+5	1.1E+6	2.1E+6	2.1E+9	2.6E+5 (C)	2.6E+5 (C)	2.6E+5 (C)	2.6E+5



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

Guidesheet Number →			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
#10			#21	#12	#13	#22		#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
para-Chlorobenzenesulfonic acid	98668	NA	1.5E+05	4.2E+05	NA	NA	ID	ID	ID	ID	ID	7.3E+08	1.0E+09	8.6E+08	ID
1-Chloro-1,1-difluoroethane	75683	NA	3.0E+5	8.8E+05	NA	9.6E+5 (C)	9.6E+5 (C)	9.4E+7	5.7E+8	1.4E+9	1.5E+12	9.6E+5 (C)	9.6E+5 (C)	9.6E+5 (C)	9.6E+5
Chloroethane	75003	NA	8,600	34,000	ID	9.5E+5 (C)	9.5E+5 (C)	3.6E+7	1.2E+8	2.8E+8	2.9E+11	9.5E+5 (C)	9.5E+5 (C)	9.5E+5 (C)	9.5E+5
2-Chloroethyl vinyl ether	110758	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	1.9E+6
Chloroform	67663	NA	1,600 (W)	1,600 (W)	3,400 (X)	1.5E+6 (C)	38,000	1.5E+5	3.4E+5	7.9E+5	1.6E+9	1.5E+6 (C)	1.5E+6 (C)	1.5E+6 (C)	1.5E+6
Chloromethane (I)	74873	NA	5,200	22,000	ID	1.1E+6 (C)	10,000	1.2E+5	1.0E+6	2.5E+6	2.6E+9	1.1E+6 (C)	1.1E+6 (C)	1.1E+6 (C)	1.1E+6
4-Chloro-3-methylphenol	59507	NA	5,800	16,000	280	3.0E+6	NLV	NLV	NLV	NLV	ID	1.5E+7	2.0E+7	1.7E+7	NA
beta-Chloronaphthalene	91587	NA	6.2E+5	1.8E+6	NA	2.3E+6	ID	ID	ID	ID	ID	1.8E+8	2.6E+8	2.1E+8	NA
2-Chlorophenol	95578	NA	900	2,600	440	1.9E+6	ID	ID	ID	ID	ID	4.5E+6	6.3E+6	5.3E+6	1.9E+7
o-Chlorotoluene (I)	95498	NA	3,300	9,300	NA	5.0E+5 (C)	5.0E+5 (C)	1.5E+6	3.1E+6	6.4E+6	2.1E+9	5.0E+5 (C)	5.0E+5 (C)	5.0E+5 (C)	5.0E+5
Chlorpyrifos	2921882	NA	17,000	48,000	1,500	8.4E+5	240	5,500	23,000	56,000	5.9E+7	3.4E+7	6.0E+7	4.4E+7	NA
Chromium (III) (B,H)	16065831	18,000 (total)	1.0E+9 (D)	1.0E+9 (D)	(G,X)	1.0E+9 (D)	NLV	NLV	NLV	NLV	1.5E+8	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Chromium (VI)	18540299	NA	30,000	30,000	3,300	1.4E+8	NLV	NLV	NLV	NLV	2.4E+5	9.2E+6	1.0E+7	9.6E+6	NA
Chrysene (Q)	218019	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	8.0E+6	1.6E+7	1.1E+7	NA
Cobalt	7440484	6,800	800	2,000	2,000	4.8E+7	NLV	NLV	NLV	NLV	5.9E+6	9.0E+6	1.0E+7	1.0E+7	NA
Copper (B)	7440508	32,000	5.8E+6	5.8E+6	(G)	1.0E+9 (D)	NLV	NLV	NLV	NLV	5.9E+7	7.3E+7	7.9E+7	7.6E+7	NA
Cyanazine	21725462	NA	200	200	1,100 (X)	56,000	NLV	NLV	NLV	NLV	ID	66,000	92,000	77,000	NA
Cyanide (P,R)	57125	390 (total)	4,000	4,000	100	2.5E+5	NLV	NLV	NLV	NLV	2.5E+5	2.5E+5	2.5E+5	2.5E+5	NA
Cyclohexanone	108941	NA	5.2E+6	1.5E+7	NA	2.2E+8 (C)	32,000	1.3E+6	1.1E+7	2.7E+7	2.9E+10	2.2E+8 (C)	2.2E+8 (C)	2.2E+8 (C)	2.2E+8
Dacthal	1861321	NA	50,000	1.4E+5	NA	3.4E+5	NLV	NLV	NLV	NLV	ID	7.3E+6	1.0E+7	8.6E+6	NA
Dalapon	75990	NA	4,000	4,000	NA	5.9E+7 (C)	NLV	NLV	NLV	NLV	ID	5.9E+7 (C)	5.9E+7 (C)	5.9E+7 (C)	5.9E+7
4,4'-DDD	72548	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	5.6E+7	4.0E+5	7.1E+5	5.2E+5	NA
4,4'-DDE	72559	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	4.0E+7	1.9E+5	3.3E+5	2.4E+5	NA
4,4'-DDT	50293	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	4.0E+7	2.8E+5	3.4E+5	3.1E+5	NA



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Decabromodiphenyl ether	1163195	NA	1.4E+5	1.4E+5	NA	1.4E+5	1.0E+9 (D)	1.0E+8	1.0E+8	1.0E+8	1.0E+9	1.1E+7	2.0E+7	1.5E+7	NA
Di-n-butyl phthalate	84742	NA	7.6E+5 (C)	7.6E+5 (C)	11,000	7.6E+5 (C)	NLV	NLV	NLV	NLV	1.5E+9	7.6E+5 (C)	7.6E+5 (C)	7.6E+5 (C)	7.6E+5
Di(2-ethylhexyl) adipate	103231	NA	9.6E+5 (C)	9.6E+5 (C)	NA	9.6E+5 (C)	NLV	NLV	NLV	NLV	1.2E+10	9.6E+5 (C,DD)	9.6E+5 (C,DD)	9.6E+5 (C,DD)	9.6E+5
Di-n-octyl phthalate	117840	NA	1.0E+8	1.4E+8 (C)	ID	1.4E+8 (C)	NLV	NLV	NLV	NLV	ID	2.0E+7	3.6E+7	2.6E+7	1.4E+8
Diacetone alcohol (I)	123422	NA	ID	ID	NA	ID	NLV	NLV	NLV	NLV	7.1E+10	ID	ID	ID	1.1E+8
Diazinon	333415	NA	95	280	NA	95,000	NLV	NLV	NLV	NLV	ID	70,000 (DD)	1.1E+5 (DD)	86,000 (DD)	3.1E+5
Dibenzo(a,h)anthracene (Q)	53703	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	8,000	16,000	11,000	NA
Dibenzofuran	132649	NA	ID	ID	1,700	ID	ID	ID	ID	ID	ID	ID	ID	ID	NA
Dibromochloromethane	124481	NA	1,600 (W)	1,600 (W)	ID	3.6E+5	21,000	80,000	80,000	98,000	1.6E+8	5.0E+5	6.1E+5 (C)	5.8E+5	6.1E+5
Dibromochloropropane	96128	NA	10 (M); 4.0	10 (M); 4.0	NA	1,200 (C)	1,200 (C)	15,000	15,000	15,000	5.9E+6	1,200 (C)	1,200 (C)	1,200 (C)	1,200
Dibromomethane	74953	NA	1,600	4,600	NA	2.0E+6 (C)	ID	ID	ID	ID	ID	2.0E+6 (C)	2.0E+6 (C)	2.0E+6 (C)	2.0E+6
Dicamba	1918009	NA	4,400	13,000	NA	1.2E+7	NLV	NLV	NLV	NLV	ID	1.7E+7	3.5E+7	2.3E+7	NA
1,2-Dichlorobenzene	95501	NA	14,000	14,000	360	2.1E+5 (C)	2.1E+5 (C)	4.6E+7	4.6E+7	5.5E+7	4.4E+10	2.1E+5 (C)	2.1E+5 (C)	2.1E+5 (C)	2.1E+5
1,3-Dichlorobenzene	541731	NA	170	480	1,100	51,000	ID	ID	ID	ID	ID	1.7E+5 (C)	1.7E+5 (C)	1.7E+5 (C)	1.7E+5
1,4-Dichlorobenzene	106467	NA	1,700	1,700	290	1.4E+5	1.0E+5	2.6E+5	2.6E+5	3.4E+5	5.7E+8	1.9E+6	2.6E+6	2.2E+6	NA
3,3'-Dichlorobenzidine	91941	NA	2,000 (M); 28	2,000 (M); 110	2,000 (M,X); 510	4,600	NLV	NLV	NLV	NLV	8.2E+6	30,000	43,000	36,000	NA
Dichlorodifluoromethane	75718	NA	95,000	2.7E+5	ID	1.0E+6 (C)	1.7E+6	6.3E+7	5.5E+8	1.4E+9	1.5E+12	1.0E+6 (C)	1.0E+6 (C)	1.0E+6 (C)	1.0E+6
1,1-Dichloroethane	75343	NA	18,000	50,000	15,000	8.9E+5 (C)	4.3E+5	2.5E+6	6.0E+6	1.4E+7	1.5E+10	8.9E+5 (C)	8.9E+5 (C)	8.9E+5 (C)	8.9E+5
1,2-Dichloroethane (I)	107062	NA	100	100	7,200 (X)	3.8E+5	11,000	21,000	33,000	74,000	1.5E+8	4.2E+5	5.9E+5	4.9E+5	1.2E+6
1,1-Dichloroethylene (I)	75354	NA	140	140	1,300 (X)	2.2E+5	330	3,700	15,000	37,000	7.8E+7	5.7E+5 (C)	5.7E+5 (C)	5.7E+5 (C)	5.7E+5
cis-1,2-Dichloroethylene	156592	NA	1,400	1,400	12,000	6.4E+5 (C)	41,000	2.1E+5	4.3E+5	1.0E+6	1.0E+9	6.4E+5 (C)	6.4E+5 (C)	6.4E+5 (C)	6.4E+5
trans-1,2-Dichloroethylene	156605	NA	2,000	2,000	30,000	1.4E+6 (C)	43,000	3.3E+5	8.4E+5	2.0E+6	2.1E+9	1.4E+6 (C)	1.4E+6 (C)	1.4E+6 (C)	1.4E+6
2,6-Dichloro-4-nitroaniline	99309	NA	44,000	1.3E+5	NA	1.4E+5	NLV	NLV	NLV	NLV	ID	2.2E+8	3.1E+8	2.6E+8	NA
2,4-Dichlorophenol	120832	NA	1,500	4,200	380	9.6E+5	NLV	NLV	NLV	NLV	2.3E+9	1.8E+6 (C,DD)	1.8E+6 (C,DD)	1.8E+6 (C,DD)	1.8E+6



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

Guidesheet Number →		#10	Groundwater Protection				Indoor Air	Ambient Air (Y)					Direct Contact			
			#21	#12	#13		#22	#23	#24	#25	#26		#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs		Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
2,4-Dichlorophenoxyacetic acid	94757	NA	1,400	1,400	4,400	2.4E+6	NLV	NLV	NLV	NLV	2.9E+9		8.6E+6	1.0E+7	9.4E+6	NA
1,2-Dichloropropane (I)	78875	NA	100	100	5,800 (X)	3.2E+5	7,400	30,000	51,000	1.2E+5	1.2E+8		5.5E+5 (C)	5.5E+5 (C)	5.5E+5 (C)	5.5E+5
1,3-Dichloropropene	542756	NA	170	700	NA	1.1E+5	5,400	60,000	2.0E+5	4.7E+5	5.9E+8		2.4E+5	3.4E+5	2.9E+5	6.2E+5
Dichlorovos	62737	NA	50 (M); 32	130	NA	1.2E+5	NLV	NLV	NLV	NLV	1.5E+7		47,000	65,000	55,000	2.2E+6
Dicyclohexyl phthalate	84617	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID		ID	ID	ID	NA
Dieldrin	60571	NA	NLL	NLL	NLL	NLL	7.2E+5	64,000	64,000	64,000	8.5E+5		4,700	8,300	6,100	NA
Diethyl ether	60297	NA	200	200	ID	7.4E+6 (C)	7.4E+6 (C)	1.0E+8	1.6E+8	3.5E+8	3.5E+11		7.4E+6 (C)	7.4E+6 (C)	7.4E+6 (C)	7.4E+6
Diethyl phthalate	84662	NA	1.1E+5	3.2E+5	2,200	7.4E+5 (C)	NLV	NLV	NLV	NLV	1.5E+9		7.4E+5 (C)	7.4E+5 (C)	7.4E+5 (C)	7.4E+5
Diethylene glycol monobutyl ether	112345	NA	1,800	5,000	NA	8.0E+7	NLV	NLV	NLV	NLV	5.9E+8		8.7E+6	1.2E+7	1.0E+7	1.1E+8
Diisopropyl ether	108203	NA	600	1,300 (C)	ID	1,300 (C)	1,300 (C)	3.2E+6	4.8E+6	1.0E+7	1.1E+10		1,300 (C)	1,300 (C)	1,300 (C)	1,300
Diisopropylamine (I)	108189	NA	110	320	NA	4.2E+5	ID	ID	ID	ID	ID		5.6E+5	7.9E+5	6.6E+5	6.7E+6
Dimethyl phthalate	131113	NA	7.9E+5 (C)	7.9E+5 (C)	NA	7.9E+5 (C)	NLV	NLV	NLV	NLV	1.5E+9		7.9E+5 (C)	7.9E+5 (C)	7.9E+5 (C)	7.9E+5
N,N-Dimethylacetamide	127195	NA	3,600	10,000	82,000 (X)	1.1E+8 (C)	NLV	NLV	NLV	NLV	ID		1.8E+7	2.6E+7	2.1E+7	1.1E+8
N,N-Dimethylaniline	121697	NA	320	920	NA	4.0E+5	8.0E+5 (C)	5.2E+5	5.2E+5	5.2E+5	3.3E+8		8.0E+5 (C)	8.0E+5 (C)	8.0E+5 (C)	8.0E+5
Dimethylformamide (I)	68122	NA	14,000	40,000	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	8.8E+8		7.0E+7	9.8E+7	8.2E+7	1.1E+8
2,4-Dimethylphenol	105679	NA	7,400	20,000	7,600	1.0E+7	NLV	NLV	NLV	NLV	2.1E+9		3.6E+7	5.1E+7	4.3E+7	NA
2,6-Dimethylphenol	576261	NA	330 (M); 88	330 (M); 260	NA	1.3E+5	NLV	NLV	NLV	NLV	ID		4.4E+5	6.1E+5	5.1E+5	NA
3,4-Dimethylphenol	95658	NA	330 (M); 200	580	NA	3.6E+5	NLV	NLV	NLV	NLV	ID		1.0E+6	1.4E+6	1.2E+6	NA
Dimethylsulfoxide	67685	NA	4.4E+6	1.3E+7	3.8E+6	1.8E+7 (C)	NLV	NLV	NLV	NLV	ID		1.8E+7 (C)	1.8E+7 (C)	1.8E+7 (C)	1.8E+7
2,4-Dinitrotoluene	121142	NA	430	640	NA	1.7E+5	NLV	NLV	NLV	NLV	2.0E+7		2.2E+5	3.1E+5	2.6E+5	NA
Dinoseb	88857	NA	300	300	200 (M); 43	1.4E+5 (C)	NLV	NLV	NLV	NLV	ID		1.4E+5 (C,DD)	1.4E+5 (C,DD)	1.4E+5 (C,DD)	1.4E+5
1,4-Dioxane (I)	123911	NA	1,700	7,000	56,000	3.4E+7	NLV	NLV	NLV	NLV	7.1E+8		2.4E+6	3.4E+6	2.9E+6	9.7E+7
Diquat	85007	NA	400	400	NA	1.4E+7	NLV	NLV	NLV	NLV	ID		1.6E+6	2.2E+6	1.9E+6	NA
Diuron	330541	NA	620	1,800	NA	7.4E+5	NLV	NLV	NLV	NLV	2.1E+8		3.1E+6	4.4E+6	3.7E+6	NA



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Endosulfan (J)	115297	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	4.4E+6	6.1E+6	5.1E+6	NA
Endothall	145733	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.0E+9	1.2E+7	1.7E+7	1.5E+7	NA
Endrin	72208	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	1.9E+5	3.4E+5	2.5E+5	NA
Epichlorohydrin (I)	106898	NA	100	100	NA	2.2E+5	1.2E+5	37,000	37,000	37,000	2.9E+7	41,000	58,000	48,000	7.3E+6
Ethanol (I)	64175	NA	3.8E+7	7.6E+7	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	5.6E+11	1.1E+8 (C,DD)	1.1E+8 (C,DD)	1.1E+8 (C,DD)	1.1E+8
Ethyl acetate (I)	141786	NA	1.3E+5	3.8E+5	NA	7.5E+6 (C)	7.5E+6 (C)	5.9E+7	5.9E+7	1.0E+8	9.4E+10	7.5E+6 (C)	7.5E+6 (C)	7.5E+6 (C)	7.5E+6
Ethyl-tert-butyl ether (ETBE)	637923	NA	980	980	ID	ID	6.5E+5 (C)	2.3E+6	4.6E+6	1.1E+7	1.1E+10	ID	ID	ID	6.5E+5
Ethylbenzene (I)	100414	NA	1,500	1,500	360	1.4E+5 (C)	1.4E+5 (C)	2.4E+6	3.1E+6	6.5E+6	1.3E+10	1.4E+5 (C)	1.4E+5 (C)	1.4E+5 (C)	1.4E+5
Ethylene dibromide	106934	NA	20 (M); 1.0	20 (M); 1.0	20 (M); 4.0	500	3,600	5,800	5,800	9,800	1.8E+7	430	600	500	8.9E+5
Ethylene glycol	107211	NA	3.0E+5	8.4E+5	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	2.9E+10	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Ethylene glycol monobutyl ether	111762	NA	74,000	2.0E+5	NA	4.1E+7 (C)	1.4E+6	2.1E+7	1.5E+8	3.6E+8	3.8E+11	4.1E+7 (C)	4.1E+7 (C)	4.1E+7 (C)	4.1E+7
Fluoranthene	206440	NA	7.3E+5	7.3E+5	5,500	7.3E+5	1.0E+9 (D)	8.9E+8	8.8E+8	8.8E+8	4.1E+9	1.3E+8	2.4E+8	1.7E+8	NA
Fluorene	86737	NA	3.9E+5	8.9E+5	5,300	8.9E+5	1.0E+9 (D)	1.5E+8	1.5E+8	1.5E+8	4.1E+9	8.7E+7	1.2E+8	1.0E+8	NA
Fluorine (soluble fluoride) (B)	7782414	NA	40,000	40,000	NA	2.4E+8	NLV	NLV	NLV	NLV	ID	6.7E+7 (DD)	7.4E+7 (DD)	7.0E+7 (DD)	NA
Formaldehyde	50000	NA	26,000	76,000	2,400	6.0E+7 (C)	65,000	43,000	69,000	1.5E+5	3.0E+8	6.0E+7 (C)	6.0E+7 (C)	6.0E+7 (C)	6.0E+7
Formic acid (I,U)	64186	NA	2.0E+5	5.8E+5	ID	1.1E+8 (C)	2.8E+6	2.6E+5	1.6E+5	1.6E+5	5.9E+7	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
1-Formylpiperidine	2591868	NA	1,600	4,600	NA	ID	ID	ID	ID	ID	ID	8.0E+6	1.0E+7 (C)	9.4E+6	1.0E+7
Gentian violet	548629	NA	300	1,300	NA	2.0E+7	NLV	NLV	NLV	NLV	ID	4.4E+5	6.2E+5	5.2E+5	NA
Glyphosate	1071836	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	5.7E+7 (DD)	1.2E+8 (DD)	7.8E+7 (DD)	NA
Heptachlor	76448	NA	NLL	NLL	NLL	NLL	1.9E+6	2.1E+5	2.1E+5	2.1E+5	3.0E+6	23,000	42,000	30,000	NA
Heptachlor epoxide	1024573	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.5E+6	9,500	17,000	12,000	NA
n-Heptane	142825	NA	2.4E+5 (C)	2.4E+5 (C)	NA	2.4E+5 (C)	2.4E+5 (C)	2.5E+7	4.5E+7	1.0E+8	1.0E+11	2.4E+5 (C)	2.4E+5 (C)	2.4E+5 (C)	2.4E+5
Hexabromobenzene	87821	NA	5,400	5,400	ID	5,400	ID	ID	ID	ID	ID	3.1E+6	5.6E+6	4.1E+6	NA
Hexachlorobenzene (C-66)	118741	NA	1,800	1,800	350	8,200	2.2E+5	56,000	56,000	56,000	8.5E+6	37,000	67,000	49,000	NA



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

Guidesheet Number →			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
			#10	#21	#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Hexachlorobutadiene (C-46)	87683	NA	26,000	72,000	91	3.5E+5 (C)	3.5E+5 (C)	4.6E+5	4.6E+5	4.6E+5	1.8E+8	3.5E+5 (C)	3.5E+5 (C)	3.5E+5 (C)	3.5E+5
alpha-Hexachlorocyclohexane	319846	NA	18	71	NA	2,500	1.6E+5	41,000	86,000	86,000	2.1E+6	12,000	17,000	14,000	NA
beta-Hexachlorocyclohexane	319857	NA	37	150	NA	5,100	NLV	NLV	NLV	NLV	7.4E+6	25,000	35,000	29,000	NA
Hexachlorocyclopentadiene (C-56)	77474	NA	3.2E+5	3.2E+5	ID	7.2E+5 (C)	56,000	60,000	60,000	60,000	5.9E+6	7.2E+5 (C)	7.2E+5 (C)	7.2E+5 (C)	7.2E+5
Hexachloroethane	67721	NA	430	1,200	1,800 (X)	1.1E+5	79,000	6.6E+5	1.4E+6	1.4E+6	1.0E+8	7.3E+5	1.0E+6	8.6E+5	NA
n-Hexane	110543	NA	44,000 (C)	44,000 (C)	NA	44,000 (C)	44,000 (C)	3.5E+6	3.5E+6	6.4E+6	5.9E+9	44,000 (C)	44,000 (C)	44,000 (C)	44,000
2-Hexanone	591786	NA	20,000	58,000	NA	2.5E+6 (C)	1.8E+6	1.3E+6	1.3E+6	1.5E+6	1.2E+9	2.5E+6 (C)	2.5E+6 (C)	2.5E+6 (C)	2.5E+6
Indeno(1,2,3-cd)pyrene (Q)	193395	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	80,000	1.6E+5	1.1E+5	NA
Iron (B)	7439896	1.2E+7	6,000	6,000	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	5.8E+8	6.2E+8	6.0E+8	NA
Isobutyl alcohol (I)	78831	NA	46,000	1.3E+5	NA	8.9E+6 (C)	8.9E+6 (C)	9.5E+7	9.5E+7	9.5E+7	4.4E+10	8.9E+6 (C)	8.9E+6 (C)	8.9E+6 (C)	8.9E+6
Isophorone	78591	NA	15,000	62,000	11,000 (X)	2.4E+6 (C)	NLV	NLV	NLV	NLV	8.2E+9	2.4E+6 (C)	2.4E+6 (C)	2.4E+6 (C)	2.4E+6
Isopropyl alcohol (I)	67630	NA	9,400	26,000	1.1E+6 (X)	1.1E+8 (C)	NLV	NLV	NLV	NLV	6.5E+9	4.7E+7	6.5E+7	5.5E+7	1.1E+8
Isopropyl benzene	98828	NA	91,000	2.6E+5	ID	3.9E+5 (C)	3.9E+5 (C)	2.0E+6	2.0E+6	3.0E+6	2.6E+9	3.9E+5 (C)	3.9E+5 (C)	3.9E+5 (C)	3.9E+5
Lead (B)	7439921	21,000	7.0E+5	7.0E+5	(G,X)	ID	NLV	NLV	NLV	NLV	4.4E+7	9.0E+5 (DD)	4.0E+5	4.0E+5	NA
Lindane	58899	NA	20 (M); 7.0	20 (M); 7.0	20 (M); 0.99	7,100	ID	ID	ID	ID	ID	42,000	49,000	45,000	NA
Lithium (B)	7439932	9,800	3,400	7,000	1,900	1.1E+8	NLV	NLV	NLV	NLV	ID	3.1E+7 (DD)	3.5E+7 (DD)	3.3E+7 (DD)	NA
Magnesium (B)	7439954	NA	8.0E+6	2.2E+7	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	2.9E+9	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Manganese (B)	7439965	4.4E+5	1,000	1,000	(G,X)	1.8E+8	NLV	NLV	NLV	NLV	1.5E+6	9.0E+7	9.8E+7	9.4E+7	NA
Mercury (Total) (B,Z)	Varies	130	1,700	1,700	50 (M); 1.2	47,000	89,000	62,000	62,000	62,000	8.8E+6	5.8E+5	6.2E+5	6.0E+5	NA
Methane	74828	NA	ID	ID	NA	ID	8.4E+6 ug/m3 (GG)	ID	ID	ID	ID	ID	ID	ID	ID
Methanol	67561	NA	74,000	2.0E+5	9,600	3.1E+6 (C)	3.1E+6 (C)	3.7E+7	4.6E+7	9.7E+7	9.6E+10	3.1E+6 (C)	3.1E+6 (C)	3.1E+6 (C)	3.1E+6
Methoxychlor	72435	NA	16,000	16,000	NA	18,000	ID	ID	ID	ID	ID	5.6E+6	1.0E+7	7.3E+6	NA
2-Methoxyethanol (I)	109864	NA	150	420	NA	1.7E+7	NLV	NLV	NLV	NLV	5.9E+8	7.3E+5	1.0E+6	8.6E+5	1.1E+8
2-Methyl-4-chlorophenoxyacetic acid	94746	NA	390	1,100	NA	4.9E+5	NLV	NLV	NLV	NLV	ID	7.3E+5	1.0E+6	8.6E+5	NA



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

Guidesheet Number →			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
#10			#21	#12	#13		#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
2-Methyl-4,6-dinitrophenol	534521	NA	830 (M); 400	830 (M); 400	NA	1.9E+5	NLV	NLV	NLV	NLV	ID	2.6E+5	3.6E+5	3.0E+5	NA
N-Methyl-morpholine (I)	109024	NA	400	1,100	NA	3.0E+7	NLV	NLV	NLV	NLV	ID	2.0E+6	2.8E+6	2.3E+6	1.1E+8
Methyl parathion	298000	NA	46	130	NA	76,000	NLV	NLV	NLV	NLV	ID	1.8E+5	2.6E+5	2.1E+5	NA
4-Methyl-2-pentanone (MIBK) (I)	108101	NA	36,000	1.0E+5	ID	2.7E+6 (C)	2.7E+6 (C)	5.3E+7	5.3E+7	7.0E+7	6.0E+10	2.7E+6 (C)	2.7E+6 (C)	2.7E+6 (C)	2.7E+6
Methyl-tert-butyl ether (MTBE)	1634044	NA	800	800	15,000 (X)	5.9E+6 (C)	5.9E+6 (C)	3.0E+7	4.1E+7	8.9E+7	8.8E+10	5.9E+6 (C)	5.9E+6 (C)	5.9E+6 (C)	5.9E+6
Methylcyclopentane (I)	96377	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	3.5E+5
4,4'-Methylene-bis-2-chloroaniline (MBOCA)	101144	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	1.1E+8	32,000	44,000	37,000	NA
Methylene chloride	75092	NA	100	100	19,000 (X)	2.3E+6 (C)	2.4E+5	7.0E+5	1.7E+6	4.0E+6	8.3E+9	2.3E+6 (C)	2.3E+6 (C)	2.3E+6 (C)	2.3E+6
2-Methylnaphthalene	91576	NA	57,000	1.7E+5	ID	5.5E+6	ID	ID	ID	ID	ID	2.6E+7	3.7E+7	3.1E+7	NA
Methylphenols (J)	1319773	NA	7,400	20,000	1,400	1.6E+7	NLV	NLV	NLV	NLV	2.9E+9	3.6E+7	5.1E+7	4.3E+7	NA
Metolachlor	51218452	NA	4,800	20,000	NA	4.4E+5 (C)	NLV	NLV	NLV	NLV	ID	4.4E+5 (C,DD)	4.4E+5 (C,DD)	4.4E+5 (C,DD)	4.4E+5
Metnubuzin	21087649	NA	3,600	10,000	NA	2.40E+07	ID	ID	ID	ID	ID	2.8E+7	5.0E+7	3.6E+7	NA
Mirex	2385855	NA	NLL	NLL	NLL	NLL	ID	ID	ID	ID	ID	40,000	72,000	52,000	NA
Molybdenum (B)	7439987	NA	1,500	4,200	16,000 (X)	1.9E+7	NLV	NLV	NLV	NLV	ID	9.6E+6	1.0E+7	1.0E+7	NA
Naphthalene	91203	NA	35,000	1.0E+5	870	2.1E+6	4.7E+5	3.5E+5	3.5E+5	3.5E+5	8.8E+7	5.2E+7	7.2E+7	6.1E+7	NA
Nickel (B)	7440020	20,000	1.0E+5	1.0E+5	(G)	1.0E+9 (D)	NLV	NLV	NLV	NLV	1.6E+7	1.5E+8	1.6E+8	1.5E+8	NA
Nitrate (B,N)	14797558	NA	2.0E+5 (N)	2.0E+5 (N)	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Nitrite (B,N)	14797650	NA	20,000 (N)	20,000 (N)	NA	3.8E+8	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Nitrobenzene (I)	98953	NA	330 (M); 68	330 (M); 190	3,600 (X)	2.2E+5	1.7E+5	64,000	64,000	64,000	2.1E+7	3.4E+5	4.7E+5	3.9E+5	4.9E+5
2-Nitrophenol	88755	NA	400	1,200	ID	1.6E+6	NLV	NLV	NLV	NLV	ID	2.0E+6	2.9E+6	2.4E+6	NA
n-Nitroso-di-n-propylamine	621647	NA	330 (M); 100	330 (M); 100	NA	7.200	NLV	NLV	NLV	NLV	2.0E+6	5,400	7,600	6,400	1.5E+6
N-Nitrosodiphenylamine	86306	NA	5,400	22,000	NA	7.0E+5	NLV	NLV	NLV	NLV	ID	7.8E+6	1.1E+7	9.2E+6	NA
Oxamyl	23135220	NA	4,000	4,000	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	2.8E+7	3.9E+7	3.3E+7	NA
Oxo-hexyl acetate	88230357	NA	1,500	4,200	NA	ID	ID	ID	ID	ID	2.4E+9	7.3E+6	1.0E+7	8.6E+6	1.0E+7



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Pendimethalin	40487421	NA	1.1E+6	1.1E+6	NA	1.1E+6	NLV	NLV	NLV	NLV	ID	1.3E+8	2.4E+8	1.7E+8	NA
Pentachlorobenzene	608935	NA	29,000	81,000	9,500	1.9E+5 (C)	ID	ID	ID	ID	ID	1.9E+5 (C)	1.9E+5 (C)	1.9E+5 (C)	1.9E+5
Pentachloronitrobenzene	82688	NA	37,000	37,000	NA	37,000	2.2E+5	2.8E+5	2.8E+5	2.8E+5	1.5E+8	5.5E+6	7.7E+6	6.4E+6	NA
Pentachlorophenol	87865	NA	22	22	(G,X)	4,300	NLV	NLV	NLV	NLV	1.3E+8	3.2E+5	9.2E+5	4.9E+5	NA
Pentane	109660	NA	ID	ID	NA	ID	1.8E+5	4.4E+7	3.4E+8	6.0E+08	5.3E+11	ID	ID	ID	2.4E+5
2-Pentene (I)	109682	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	2.2E+5
Phenanthrene	85018	NA	56,000	1.6E+5	5,300	1.1E+6	5.1E+6	1.9E+5	1.9E+5	1.9E+5	2.9E+6	5.2E+6	7.2E+6	6.1E+6	NA
Phenol	108952	NA	88,000	2.6E+5	4,200	1.2E+7 (C)	NLV	NLV	NLV	NLV	1.8E+10	1.2E+7 (C,DD)	1.2E+7 (C,DD)	1.2E+7 (C,DD)	1.2E+7
Phosphorus (Total)	7723140	NA	1.3E+6	4.8E+6	(EE)	ID	NLV	NLV	NLV	NLV	ID	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Phthalic acid	88993	NA	2.8E+5	8.0E+5	NA	1.7E+6 (C)	NLV	NLV	NLV	NLV	ID	1.7E+6 (C)	1.7E+6 (C)	1.7E+6 (C)	1.7E+6
Phthalic anhydride	85449	NA	3.0E+5	8.8E+5	NA	1.1E+6 (C)	NLV	NLV	NLV	NLV	ID	1.1E+6 (C)	1.1E+6 (C)	1.1E+6 (C)	1.1E+6
Picloram	1918021	NA	10,000	10,000	920	8.6E+6	NLV	NLV	NLV	NLV	ID	5.1E+7	7.1E+7	6.0E+7	NA
Piperidine	110894	NA	64	180	NA	6.8E+5	NLV	NLV	NLV	NLV	4.1E+9	3.2E+5	4.5E+5	3.8E+5	1.2E+8
Polybrominated biphenyls (J)	67774327	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	ID	4,800	8,600	6,300	NA
Polychlorinated biphenyls (PCBs) (J,T)	1336363	NA	NLL	NLL	NLL	NLL	1.6E+7	8.1E+5	2.8E+7	2.8E+7	6.5E+6	(T)	(T)	(T)	NA
Prometon	1610180	NA	4,900	14,000	NA	5.5E+6	NLV	NLV	NLV	NLV	ID	1.6E+7	2.2E+7	1.9E+7	NA
Propachlor	1918167	NA	1,900	5,400	NA	8.8E+6	NLV	NLV	NLV	NLV	ID	9.5E+6	1.3E+7	1.1E+7	NA
Propazine	139402	NA	4,000	11,000	NA	1.7E+5	NLV	NLV	NLV	NLV	ID	2.0E+7	2.8E+7	2.3E+7	NA
Propionic acid	79094	NA	2.4E+5	7.0E+5	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	8.8E+9	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Propyl alcohol (I)	71238	NA	28,000	80,000	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	2.1E+10	7.4E+7 (DD)	1.1E+8 (DD)	9.1E+7(DD)	1.1E+8
n-Propylbenzene (I)	103651	NA	1,600	4,600	NA	3.0E+5	ID	ID	ID	ID	5.9E+8	8.0E+6	1.0E+7 (C)	9.4E+6	1.0E+7
Propylene glycol	57556	NA	3.0E+6	8.4E+6	5.8E+6	1.1E+8 (C)	NLV	NLV	NLV	NLV	1.8E+11	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Pyrene	129000	NA	4.8E+5	4.8E+5	ID	4.8E+5	1.0E+9 (D)	7.8E+8	7.8E+8	7.8E+8	2.9E+9	8.4E+7	1.5E+8	1.1E+8	NA
Pyridine (I)	110861	NA	400	420	NA	37,000 (C)	2,000	9,800	40,000	97,000	1.0E+8	37,000 (C)	37,000 (C)	37,000 (C)	37,000





**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Selenium (B)	7782492	410	4,000	4,000	400	7.8E+7	NLV	NLV	NLV	NLV	5.9E+7	9.6E+6	1.0E+7	1.0E+7	NA
Silver (B)	7440224	1,000	4,500	13,000	100 (M); 27	2.0E+8	NLV	NLV	NLV	NLV	2.9E+6	9.0E+6	9.8E+6	9.4E+6	NA
Silvex (2,4,5-TP)	93721	NA	3,600	3,600	2,200	3.1E+6	NLV	NLV	NLV	NLV	ID	5.5E+6	7.7E+6	6.4E+6	NA
Simazine	122349	NA	80	80	NA	90,000	NLV	NLV	NLV	NLV	ID	3.8E+6	5.3E+6	4.5E+6	NA
Sodium	17341252	NA	2.5E+6	7.0E+6	NA	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Sodium azide	26628228	NA	1,800	5,000	NA	ID	ID	ID	ID	ID	ID	8.70E+06	1.20E+07	1.00E+07	NA
Strontium (B)	7440246	NA	92,000	2.6E+5	46,000 (X)	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	1.0E+9 (D)	1.0E+9 (D)	1.0E+9 (D)	NA
Styrene	100425	NA	2,700	2,700	2,200	2.7E+5	5.2E+5 (C)	3.3E+6	3.3E+6	4.2E+6	6.9E+9	5.2E+5 (C)	5.2E+5 (C)	5.2E+5 (C)	5.2E+5
Sulfate	14808798	NA	5.0E+6	5.0E+6	NA	ID	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Tebuthiuron	34014181	NA	10,000	30,000	NA	5.0E+7	NLV	NLV	NLV	NLV	ID	2.7E+7 (DD)	4.2E+7 (DD)	3.3E+7 (DD)	NA
2,3,7,8-Tetrabromodibenzo-p-dioxin (O)	50585416	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	(O)	(O)	(O)	(O)	NA
1,2,4,5-Tetrachlorobenzene	95943	NA	1.5E+6	1.5E+6	3,400 (X)	1.5E+6	ID	ID	ID	ID	ID	2.5E+8	3.5E+8	2.9E+8	NA
2,3,7,8-Tetrachlorodibenzo-p-dioxin (O)	1746016	NA	NLL	NLL	NLL	NLL	NLV	NLV	NLV	NLV	89 (O)	0.99 (O)	1.4 (O)	2.9 (O)	NA
1,1,1,2-Tetrachloroethane	630206	NA	1,500	6,400	ID (X)	4.4E+5 (C)	33,000	1.2E+5	2.1E+5	3.3E+5	5.3E+8	4.4E+5 (C)	4.4E+5 (C)	4.4E+5 (C)	4.4E+5
1,1,2,2-Tetrachloroethane	79345	NA	170	700	1,600 (X)	94,000	23,000	34,000	34,000	34,000	6.8E+7	2.4E+5	3.4E+5	2.9E+5	8.7E+5
Tetrachloroethylene	127184	NA	100	100	900 (X)	88,000 (C)	60,000	6.0E+5	1.4E+6	3.3E+6	6.8E+9	88,000 (C)	88,000 (C)	88,000 (C)	88,000
Tetrahydrofuran	109999	NA	1,900	5,400	2.2E+5 (X)	3.2E+7	2.4E+6	1.5E+7	6.7E+7	1.6E+8	1.7E+11	9.5E+6	1.3E+7	1.1E+7	1.2E+8
Tetranitromethane	509148	NA	ID	ID	ID	ID	600	500 (M); 180	ID	ID	2.6E+5	ID	ID	ID	ID
Thallium (B)	7440280	NA	2,300	2,300	4,200 (X)	1.5E+7	NLV	NLV	NLV	NLV	ID	1.3E+5	1.4E+5	1.3E+5	NA
Toluene (I)	108883	NA	16,000	16,000	2,800	2.5E+5 (C)	2.5E+5 (C)	3.3E+6	3.6E+7	3.6E+7	1.2E+10	2.5E+5 (C)	2.5E+5 (C)	2.5E+5 (C)	2.5E+5
p-Toluidine	106490	NA	660 (M); 300	1,200	NA	4.8E+5	NLV	NLV	NLV	NLV	1.3E+8	4.3E+5	6.1E+5	5.1E+5	1.2E+6
Toxaphene	8001352	NA	24,000	24,000	860	3.6E+5	NLV	NLV	NLV	NLV	1.2E+7	85,000	1.5E+5	1.1E+5	NA
Trallate	2303175	NA	95,000	2.5E+5 (C)	NA	2.5E+5 (C)	ID	ID	ID	ID	ID	2.5E+5 (C)	2.5E+5 (C)	2.5E+5 (C)	2.5E+5
Tributylamine	102829	NA	7,800	23,000	ID	1.8E+6	1.1E+6	7.2E+5	7.2E+5	7.2E+5	2.1E+8	2.6E+6	3.6E+6	3.0E+6	3.7E+6



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
1,2,4-Trichlorobenzene	120821	NA	4,200	4,200	1,800	1.1E+6	1.1E+6 (C)	3.4E+7	3.4E+7	3.4E+7	1.1E+10	1.1E+6 (C,DD)	1.1E+6 (C,DD)	1.1E+6 (C,DD)	1.1E+6
1,1,1-Trichloroethane	71556	NA	4,000	4,000	4,000	4.6E+5 (C)	4.6E+5	4.5E+6	1.5E+7	3.1E+7	2.9E+10	4.6E+5 (C)	4.6E+5 (C)	4.6E+5 (C)	4.6E+5
1,1,2-Trichloroethane	79005	NA	100	100	6,600 (X)	4.2E+5	24,000	57,000	57,000	1.2E+5	2.5E+8	8.4E+5	9.2E+5 (C)	9.2E+5 (C)	9.2E+5
Trichloroethylene	79016	NA	100	100	4,000 (X)	4.4E+5	37,000	2.6E+5	4.4E+5	1.1E+6	2.3E+9	5.0E+5 (C,DD)	5.0E+5 (C,DD)	5.0E+5 (C,DD)	5.0E+5
Trichlorofluoromethane	75694	NA	52,000	1.5E+5	NA	5.6E+5 (C)	5.6E+5 (C)	1.1E+8	1.4E+11	1.4E+11	1.7E+12	5.6E+5 (C)	5.6E+5 (C)	5.6E+5 (C)	5.6E+5
2,4,5-Trichlorophenol	95954	NA	39,000	1.1E+5	NA	9.1E+6	NLV	NLV	NLV	NLV	1.0E+10	7.3E+7	1.0E+8	8.6E+7	NA
2,4,6-Trichlorophenol	88062	NA	2,400	9,400	330 (M); 100	2.0E+5	NLV	NLV	NLV	NLV	1.3E+9	3.3E+6	4.6E+6	3.9E+6	NA
1,2,3-Trichloropropane	96184	NA	840	2,400	NA	8.3E+5 (C)	ID	ID	ID	ID	ID	8.3E+5 (C)	8.3E+5 (C)	8.3E+5 (C)	8.3E+5
1,1,2-Trichloro-1,2,2-trifluoroethane	76131	NA	5.5E+5 (C)	5.5E+5 (C)	1,700	5.5E+5 (C)	5.5E+5 (C)	2.1E+8	8.9E+8	2.1E+9	2.3E+12	5.5E+5 (C)	5.5E+5 (C)	5.5E+5 (C)	5.5E+5
Triethanolamine	102716	NA	74,000	2.0E+5	NA	1.1E+8 (C)	NLV	NLV	NLV	NLV	1.5E+9	1.1E+8 (C)	1.1E+8 (C)	1.1E+8 (C)	1.1E+8
Triethylene glycol	112276	NA	1.1E+5 (C)	1.1E+5 (C)	NA	1.1E+5 (C)	NLV	NLV	NLV	NLV	ID	1.1E+5 (C,DD)	1.1E+5 (C,DD)	1.1E+5 (C,DD)	1.1E+5
3-Trifluoromethyl-4-nitrophenol	88302	NA	1.1E+5	3.1E+5	NA	1.2E+8	NLV	NLV	NLV	NLV	ID	2.4E+8 (DD)	3.7E+8 (DD)	3.0E+8 (DD)	NA
Trifluralin	1582098	NA	1.9E+5	5.7E+5	NA	1.2E+7	ID	ID	ID	ID	ID	5.7E+6	1.0E+7	7.4E+6	NA
2,2,4-Trimethyl pentane	540841	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	19,000
2,4,4-Trimethyl-2-pentene (I)	107404	NA	ID	ID	NA	ID	ID	ID	ID	ID	ID	ID	ID	ID	56,000
1,2,4-Trimethylbenzene (I)	95636	NA	2,100	2,100	570	1.1E+5 (C)	1.1E+5 (C)	2.5E+7	6.0E+8	6.0E+8	3.6E+10	1.1E+5 (C)	1.1E+5 (C)	1.1E+5 (C)	1.1E+5
1,3,5-Trimethylbenzene (I)	108678	NA	1,800	1,800	1,100	94,000 (C)	94,000 (C)	1.9E+7	4.6E+8	4.6E+8	3.6E+10	94,000 (C)	94,000 (C)	94,000 (C)	94,000
Triphenyl phosphate	115866	NA	1.1E+5 (C)	1.1E+5 (C)	NA	1.1E+5 (C)	NLV	NLV	NLV	NLV	ID	1.1E+5 (C)	1.1E+5 (C)	1.1E+5 (C)	1.1E+5
Tris(2,3-Dibromopropyl)phosphate	126727	NA	930	930	NA	27,000 (C)	27,000 (C)	60,000	60,000	60,000	7.4E+6	20,000	27,000 (C)	24,000	27,000
Urea	57136	NA	ID (N)	ID (N)	NA	ID	NLV	NLV	NLV	NLV	ID	ID	ID	ID	NA
Vanadium	7440622	NA	72,000	9.9E+5	1.9E+5	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	5.5E+6 (DD)	6.2E+6 (DD)	5.9E+6 (DD)	NA
Vinyl acetate (I)	108054	NA	13,000	36,000	NA	2.4E+6 (C)	1.5E+6	2.0E+6	2.7E+6	5.9E+6	5.9E+9	2.4E+6 (C,DD)	2.4E+6 (C,DD)	2.4E+6 (C,DD)	2.4E+6
Vinyl chloride	75014	NA	40	40	300	20,000	2,800	29,000	1.7E+5	4.2E+5	8.9E+8	34,000	47,000	40,000	4.9E+5
White phosphorus (R)	12185103	NA	2.2	6.0	NA	58,000	NLV	NLV	NLV	NLV	ID	17,000 (DD)	18,000 (DD)	18,000 (DD)	NA



**TABLE 3. SOIL: INDUSTRIAL AND COMMERCIAL II, III, AND IV  
PART 201 GENERIC CLEANUP CRITERIA AND SCREENING LEVELS;  
PART 213 TIER 1 RISK-BASED SCREENING LEVELS (RBSLs)**

			Groundwater Protection				Indoor Air	Ambient Air (Y)				Direct Contact			
Guidesheet Number →		#10	#21		#12	#13	#22	#23	#24	#25	#26	#27	#28	#29	#30
Hazardous Substance	Chemical Abstract Service Number	Statewide Default Background Levels	Residential Drinking Water Protection Criteria & RBSLs	Industrial and Commercial Drinking Water Protection Criteria & RBSLs	Groundwater Surface Water Interface Protection Criteria & RBSLs	Groundwater Contact Protection Criteria & RBSLs	Soil Volatilization to Indoor Air Inhalation Criteria & RBSLs	Infinite Source Volatile Soil Inhalation Criteria (VSIC) & RBSLs	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria & RBSLs	Industrial and Commercial II	Commercial III	Commercial IV	Soil Saturation Concentration Screening Levels
Xylenes (I)	1330207	NA	5,600	5,600	700	1.5E+5 (C)	1.5E+5 (C)	5.4E+7	6.5E+7	1.3E+8	1.3E+11	1.5E+5 (C)	1.5E+5 (C)	1.5E+5 (C)	1.5E+5
Zinc (B)	7440666	47,000	2.4E+6	5.0E+6	(G)	1.0E+9 (D)	NLV	NLV	NLV	NLV	ID	6.3E+8	6.9E+8	6.6E+8	NA

## FOOTNOTES

FOR THE PART 201 CRITERIA/  
PART 213 RISK-BASED SCREENING LEVELS  
RRD OPERATIONAL MEMORANDUM No. 1

- (A) Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.
- (B) Background, as defined in R 299.5701(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.
- (C) Value presented is a screening level based on the chemical-specific generic soil saturation concentration ( $C_{sat}$ ) since the calculated risk-based criterion is greater than  $C_{sat}$ . Concentrations greater than  $C_{sat}$  are acceptable cleanup criteria for this pathway where a site-specific demonstration indicates that free-phase material containing a hazardous substance is not present.
- (D) Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).
- (E) Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in the following table:

Hazardous Substance	Chemical Abstract Service Number	Residential Health-Based Drinking Water Value	Industrial-Commercial Health-Based Drinking Water Value
Aluminum	7429905	300	4,100
tertiary Amyl methyl ether	994058	910	2,600
Copper	7440508	1,400	4,000
Diethyl ether	60297	3,700	10,000
Ethylbenzene	100414	700	700
Iron	7439896	2,000	5,600
Manganese	7439965	860	2,500
Methyl-tert-butyl ether (MTBE)	1634044	240	690
Toluene	108883	1,000	1,000
1,2,4-Trimethylbenzene	95636	1,000	2,900
1,3,5-Trimethylbenzene	108678	1,000	2,900
Xylenes	1330207	10,000	10,000

- (F) Criterion is based on adverse impacts to plant life and phytotoxicity.
- (G) Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on

the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg CaCO<sub>3</sub>/L, use 400 mg CaCO<sub>3</sub>/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.

Hazardous Substance	FCV Formula ug/L	FCV Conversion Factor (CF)	WV ug/L	HNDV ug/L
Acetate	$\text{EXP}(0.2732 * (\text{pH}) + 7.0362)$	NA	NA	1.3E+6
Barium <sup>⊗</sup>	$\text{EXP}(1.0629 * (\text{LnH}) + 1.1869)$	NA	NA	1.6E+5
Beryllium	$\text{EXP}(2.5279 * (\text{LnH}) - 10.7689)$	NA	NA	1,200
Cadmium <sup>⊗</sup>	$(\text{EXP}(0.7852 * (\text{LnH}) - 2.715)) * \text{CF}$	$1.101672 - ((\text{LnH}) * (0.041838))$	NA	130
Chromium (III) <sup>⊗</sup>	$(\text{EXP}(0.819 * (\text{LnH}) + 0.6848)) * \text{CF}$	0.86	NA	9,400
Copper	$(\text{EXP}(0.8545 * (\text{LnH}) - 1.702)) * \text{CF}$	0.96	NA	64,000
Lead <sup>⊗</sup>	$(\text{EXP}(1.273 * (\text{LnH}) - 3.296)) * \text{CF}$	$1.46203 - ((\text{LnH}) * (0.14571))$	NA	190
Manganese	$\text{EXP}(0.8784 * (\text{LnH}) + 3.5199)$	NA	NA	59,000
Nickel	$(\text{EXP}(0.846 * (\text{LnH}) + 0.0584)) * \text{CF}$	0.997	NA	2.1E+5
Pentachlorophenol	$\text{EXP}(1.005 * (\text{pH}) - 5.134)$	NA	NA	2.8
Zinc	$(\text{EXP}(0.8473 * (\text{LnH}) + 0.884)) * \text{CF}$	0.986	NA	22,000

where,

- EXP(x) = The base of the natural logarithm raised to power x (e<sup>x</sup>).
- LnH = The natural logarithm of water hardness in mg CaCO<sub>3</sub>/L.
- \* = The multiplication symbol.
- ⊗ = The GSI criterion developed here may not be protective for surface water that is used as a drinking water source. Refer to footnote (X) for further guidance.

A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environmental Quality (DEQ) internet web site.

- (H) Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.
- (I) Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these

rules of \$45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.

- (J) Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.
- (K) Hazardous substance may be flammable or explosive, or both.
- (L) Criteria for lead are derived using a biologically based model, as allowed for under Section 20120a(10) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in the following table:

Acceptable Combinations of Lead in Drinking Water and Soil	
Drinking Water Concentration (ug/L)	Soil Concentration (mg/kg)
5	386-395
6	376-385
7	376-385
8	366-375
9	356-365
10	346-355
11	336-345
12	336-345
13	326-335
14	316-325
15	306-315

- (M) Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.
- (N) The concentrations of all potential sources of nitrate-nitrogen (e.g., ammonia-N, nitrite-N, nitrate-N) in groundwater that is used as a source of drinking water shall not, when added together, exceed the nitrate drinking water criterion of 10,000 ug/L. Where leaching to groundwater is a relevant pathway, soil concentrations of all potential sources of nitrate-nitrogen shall not, when added together, exceed the nitrate drinking water protection criterion of 2.0E+5 ug/kg.
- (O) The concentration of all polychlorinated and polybrominated dibenzodioxin and dibenzofuran isomers present at a facility, expressed as an equivalent



concentration of 2,3,7,8-tetrachlorodibenzo-p-dioxin based upon their relative potency, shall be added together and compared to the criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin. The generic cleanup criteria for 2,3,7,8-tetrachlorodibenzo-p-dioxin are not calculated according to the algorithms presented in R 299.5714 to R 299.5726. The generic cleanup criteria are being held at the values that the DEQ has used since August 1998, in recognition of the fact that national efforts to reassess risks posed by dioxin are not yet complete. Until these studies are complete, it is premature to select a revised slope factor and/or reference dose for calculation of generic cleanup criteria.

- (P) Amenable cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with all groundwater criteria. Total cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with soil criteria. Industrial-commercial direct contact criteria may not be protective of the potential for release of hydrogen cyanide gas. Additional land or resource use restrictions may be necessary to protect for the acute inhalation concerns associated with hydrogen cyanide gas.
- (Q) Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.
- (R) Hazardous substance may exhibit the characteristic of reactivity as defined in 40 C.F.R. §261.23 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of \$45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.
- (S) Criterion defaults to the hazardous substance-specific water solubility limit.
- (T) Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of \$55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the following table if TSCA standards are not applicable.

Land Use Category	TSCA, Subpart D Cleanup Standards	Part 201 Soil Direct Contact Cleanup Criteria
Residential & Commercial I	1,000 ppb, or 10,000 ppb if capped	4,000 ppb
Industrial & Commercial II	1,000 ppb, or 10,000 ppb if capped	16,000 ppb
Commercial III	1,000 ppb, or 10,000 ppb if capped	33,000 ppb
Commercial IV	1,000 ppb, or 10,000 ppb if capped	22,000 ppb

- (U) Hazardous substance may exhibit the characteristic of corrosivity as defined in 40 C.F.R. §261.22 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the DEQ, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of \$45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the DEQ, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.
- (V) Criterion is the aesthetic drinking water value as required by Section 20120(a)(5) of the NREPA. Concentrations up to 200 ug/L may be acceptable, and still allow for drinking water use, as part of a site-specific cleanup under Section 20120a(2) of the NREPA.
- (W) Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 ug/L. Concentrations of trihalomethanes in soil shall be added together to determine compliance with the drinking water protection criterion of 1,600 ug/kg.
- (X) The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. For a groundwater discharge to the Great Lakes and their connecting waters or discharge in close proximity to a water supply intake in inland surface waters, the generic GSI criterion shall be the surface water human drinking water value (HDV) listed in the table in this footnote, except for those HDV indicated with an asterisk. For HDV with an asterisk, the generic GSI criterion shall be the lowest of the HDV, the WV, and the calculated FCV. See formulas in footnote (G). Soil protection criteria based on the HDV shall be as listed in the table in this footnote, except for those values with an asterisk. Soil GSI protection criteria based on the HDV shall be as listed in the table in this footnote, except for those values with an asterisk. Soil GSI protection criteria for compounds with an asterisk shall be the greater of 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote.



Hazardous Substance	Chemical Abstract Service Number	Surface Water Human Drinking Water Values (HDV) (ug/L)	Soil GSI Protection Criteria for HDV (ug/kg)
Acrylonitrile	107131	2.0 (M); 0.87	100 (M); 17
Alachlor	15972608	3.5	91
Antimony	7440360	2	1,400
Arsenic	7440382	50	23,000
Atrazine	1912249	4.3	86
Barium	7440393	1,900*	*
Benzene	71432	12	240
bis(2-Chloroethyl)ether	111444	1 (M); 0.79	100 (M); 20
Bromate	15541454	10 (M); 0.5	200 (M); 10
Butyl benzyl phthalate	85687	6.9	13,000
Cadmium	7440439	2.5*	*
Carbon tetrachloride	56235	5.6	110
Chloride	16887006	50,000	1.0E+6
Chloroform	67663	77	1,500
Chromium (III)	16065831	120*	*
Cyanazine	21725462	2 (M); 0.93	200 (M); 40
3,3'-Dichlorobenzidine	91941	0.3 (M); 0.14	2,000 (M); 7.7
1,2-Dichloroethane	107062	6	120
1,1-Dichloroethylene	75354	24	480
1,2-Dichloropropane	78875	9.1	180
N,N-Dimethylacetamide	127195	700	14,000
1,4-Dioxane	123911	34	680
Ethylene dibromide	106934	0.05 (M); 0.006	20 (M); 1.0
Ethylene glycol	107211	56,000	1.1E+6
Heptachlor	76448	0.01 (M); 0.0017	NLL
beta-Hexachlorocyclohexane	319857	0.024	20 (M)
Hexachloroethane	67721	5.3	310
Isophorone	78591	310	6,200
Isopropyl alcohol	67630	28,000	5.6E+5
Lead	7439921	14*	*
Manganese	7439965	3600	72,000
Methyl-tert-butyl ether (MTBE)	1634044	100	2,000
Methylene chloride	75092	47	940
Mirex	2385855	0.02 (M); 1.6E-5	NLL
Molybdenum	7439987	120	2,400
Nitrobenzene	98953	4.7	330 (M); 94
Pentachlorophenol	87865	1.8*	*
1,2,4,5-Tetrachlorobenzene	95943	2.8	3,300
1,1,1,2-Tetrachloroethane	630206	19	380
1,1,2,2-Tetrachloroethane	79345	3.2	64
Tetrachloroethylene	127184	11	220
Tetrahydrofuran	109999	350	7,000
Thallium	7440280	2.0 (M); 1.2	2,300
1,1,2-Trichloroethane	79005	12	240
Trichloroethylene	79016	29	580

- (Y) Source size modifiers shown in the following table shall be used to determine soil inhalation criteria for ambient air when the source size is not one-half acre. The modifier shall be multiplied by the generic soil inhalation criteria shown in the table of generic cleanup criteria to determine the applicable criterion.

Source Size sq. feet or acres	Modifier
400 sq feet	3.17
1000 sq feet	2.2
2000 sq feet	1.76
1/4 acre	1.15
1/2 acre	1
1 acre	0.87
2 acre	0.77
5 acre	0.66
10 acre	0.6
32 acre	0.5
100 acre	0.43

- (Z) Mercury is typically measured as total mercury. The generic cleanup criteria, however, are based on data for different species of mercury. Specifically, data for elemental mercury, chemical abstract service (CAS) number 7439976, serve as the basis for the soil volatilization to indoor air criteria, groundwater volatilization to indoor air, and soil inhalation criteria. Data for methyl mercury, CAS number 22967926, serve as the basis for the GSI criterion; and data for mercuric chloride, CAS number 7487947, serve as the basis for the drinking water, groundwater contact, soil direct contact, and the groundwater protection criteria. Comparison to criteria shall be based on species-specific analytical data only if sufficient facility characterization has been conducted to rule out the presence of other species of mercury.
- (AA) Comparison to these criteria may take into account an evaluation of whether the hazardous substances are adsorbed to particulates rather than dissolved in water and whether filtered groundwater samples were used to evaluate groundwater.
- (BB) The state drinking water standard for asbestos is in units of fibers per milliliter of water (f/mL) longer than 10 millimicrons. Soil concentrations of asbestos are determined by polarized light microscopy.
- (CC) Groundwater: The generic GSI criteria are based on the toxicity of unionized ammonia ( $\text{NH}_3$ ); the criteria are 29 ug/L and 53 ug/L for cold water and warm water surface water, respectively. As a result, the GSI criterion shall be compared to the percent of the total ammonia concentration in the groundwater that will become  $\text{NH}_3$  in the surface water. This percent  $\text{NH}_3$  is a function of the pH and temperature of the receiving surface water and can be estimated using the following table,



taken from Emerson, et al., (Journal of the Fisheries Research Board of  
Canada, Volume 32(12):2382, 1975).

Percent NH<sub>3</sub> in Aqueous Ammonia Solutions for 0-30 °C and pH 6-10

Temp (°F)	Temp (°C)	pH								
		6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
32.0	0	0.00827	0.0261	0.0826	0.261	0.820	2.55	7.64	20.7	45.3
33.8	1	0.00899	0.0284	0.0898	0.284	0.891	2.77	8.25	22.1	47.3
35.6	2	0.00977	0.0309	0.0977	0.308	0.968	3.00	8.90	23.6	49.4
37.4	3	0.0106	0.0336	0.106	0.335	1.05	3.25	9.60	25.1	51.5
39.2	4	0.0115	0.0364	0.115	0.363	1.14	3.52	10.3	26.7	53.5
41.0	5	0.0125	0.0395	0.125	0.394	1.23	3.80	11.1	28.3	55.6
42.8	6	0.0136	0.0429	0.135	0.427	1.34	4.11	11.9	30.0	57.6
44.6	7	0.0147	0.0464	0.147	0.462	1.45	4.44	12.8	31.7	59.5
46.4	8	0.0159	0.0503	0.159	0.501	1.57	4.79	13.7	33.5	61.4
48.2	9	0.0172	0.0544	0.172	0.542	1.69	5.16	14.7	35.3	63.3
50.0	10	0.0186	0.0589	0.186	0.586	1.83	5.56	15.7	37.1	65.1
51.8	11	0.0201	0.0637	0.201	0.633	1.97	5.99	16.8	38.9	66.8
53.6	12	0.0218	0.0688	0.217	0.684	2.13	6.44	17.9	40.8	68.5
55.4	13	0.0235	0.0743	0.235	0.738	2.30	6.92	19.0	42.6	70.2
57.2	14	0.0254	0.0802	0.253	0.796	2.48	7.43	20.2	44.5	71.7
59.0	15	0.0274	0.0865	0.273	0.859	2.67	7.97	21.5	46.4	73.3
60.8	16	0.0295	0.0933	0.294	0.925	2.87	8.54	22.8	48.3	74.7
62.6	17	0.0318	0.101	0.317	0.996	3.08	9.14	24.1	50.2	76.1
64.4	18	0.0343	0.108	0.342	1.07	3.31	9.78	25.5	52.0	77.4
66.2	19	0.0369	0.117	0.368	1.15	3.56	10.5	27.0	53.9	78.7
68.0	20	0.0397	0.125	0.396	1.24	3.82	11.2	28.4	55.7	79.9
69.8	21	0.0427	0.135	0.425	1.33	4.10	11.9	29.9	57.5	81.0
71.6	22	0.0459	0.145	0.457	1.43	4.39	12.7	31.5	59.2	82.1
73.4	23	0.0493	0.156	0.491	1.54	4.70	13.5	33.0	60.9	83.2
75.2	24	0.0530	0.167	0.527	1.65	5.03	14.4	34.6	62.6	84.1
77.0	25	0.0569	0.180	0.566	1.77	5.38	15.3	36.3	64.3	85.1
78.8	26	0.0610	0.193	0.607	1.89	5.75	16.2	37.9	65.9	85.9
80.6	27	0.0654	0.207	0.651	2.03	6.15	17.2	39.6	67.4	86.8
82.4	28	0.0701	0.221	0.697	2.17	6.56	18.2	41.2	68.9	87.3
84.2	29	0.0752	0.237	0.747	2.32	7.00	19.2	42.9	70.4	88.3
86.0	30	0.0805	0.254	0.799	2.48	7.46	20.3	44.6	71.8	89.0

The generic approach for estimating NH<sub>3</sub> assumes a default pH of 8 and default temperatures of 68°F and 85°F for cold water and warm water surface water, respectively. The resulting percent NH<sub>3</sub> is 3.8 percent and 7.2 percent for cold water and warm water, respectively. This default percentage shall be multiplied by the total ammonia-nitrogen (NH<sub>3</sub>-N) concentration in the groundwater and the resulting NH<sub>3</sub> concentration

compared to the applicable GSI criterion. As an alternative, the maximum pH and temperature data from the specific receiving surface water can be used to estimate, from the table in this footnote, a lower percent unionized ammonia concentration for comparison to the generic GSI.

Soil: The generic soil GSI protection criteria for unionized ammonia are 580 ug/kg and 1,100 ug/kg for cold water and warm water surface water, respectively.

- (DD) Hazardous substance causes developmental effects. Residential and commercial I direct contact criteria are protective of both prenatal and postnatal exposure. Industrial and commercial II, III and IV direct contact criteria are protective for a pregnant adult receptor.
- (EE) The following are applicable generic GSI criteria as required by Section 20120a(15) of the NREPA.

Hazardous Substance	GSI (ug/L)	Notes
Phosphorus	1,000	Criteria applicable unless receiving water is a surface water that has a phosphorus waste load allocation or is an inland lake. In those cases, contact the department for applicable values.
Total dissolved solids (TDS)	5.0E+5	If TDS data are not available, the TDS criterion may be used a screening level for the sum of the concentrations of the following substances: Calcium, Chlorides, Iron, Magnesium, Potassium, Sodium, Sulfate.
Dissolved Oxygen (DO): Cold receiving waters Warm receiving waters	≥ 7,000 ≥ 5,000	Since a low level of DO can be harmful to aquatic life, the criterion represents a minimum level that on-site samples must exceed. This is in contrast to other criteria which represent "not to exceed" concentrations. DO criteria are not applicable if groundwater Carbonaceous Biochemical Oxygen Demand (CBOD) is less than 10,000 ug/L and groundwater ammonia concentration is less than 2,000 ug/L.

- (FF) The chloride GSI criterion shall be 125 mg/l when the discharge is to surface waters of the state designated as public water supply sources or 50 mg/l when the discharge is to the Great Lakes or connecting waters. Chloride GSI criteria shall not apply for surface waters of the state that are not designated as a public water supply source, however, the total dissolved solids criterion is applicable.
- (GG) Risk-based criteria are not available for methane due to insufficient toxicity data. An acceptable soil gas concentration (presented for both residential and commercial/industrial land uses) was derived utilizing 25 percent of the lower explosive level for methane. This equates to 1.25 percent or 8.4E+6 ug/m<sup>3</sup>.

"ID" means insufficient data to develop criterion.

"NA" means a criterion or value is not available or, in the case of background and CAS numbers, not applicable.



"NLL" means hazardous substance is not likely to leach under most soil conditions.

"NLV" means hazardous substance is not likely to volatilize under most conditions.